Passenger Transport Issues and Urbanization in India

by

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Abstract

Passenger transport services in Indian cities are extremely inadequate. Private vehicle ownership levels are still very low, and majority of urban trips in both large and small cities are on foot and bicycles. Vehicular transport services are provided by a number of different types of modes, generally known as IPT, operated primarily by the private sector. The government has a monopoly over standard bus operations; inspite of its commitment to being the primary provider of passenger transport services in all urban areas, it is unable to meet the escalating transport demands in the face of rapidly rising population, uneven economic growth and changing physical structure of cities.

In this thesis, we present an analysis of the availability of different transport modes and services in six cities of different sizes in India. The purpose is to understand the pattern and implications of passenger transport growth, and identify major transport issues for the future in the context of socio-economic and physical growth of cities.

Thesis Supervisor: Prof. Ralph A. Gakenheimer
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Chapter One

Orientation of the study

1.1 Introduction

Urban transport is essential in the functioning of cities; its impact on the urban economy is multi-dimensional. Urban transport provides the basic link between homes and the place of employment, and between the users and producers of goods and services. The level and nature of urban transport network also influences the cost and efficiency of other urban services like water and sewerage, waste disposal, health, and education. Physical expansion of cities and rapid growth of urban population exerts tremendous pressure on the cost and accessibility of transport services. The construction and maintenance of urban transport systems places a considerable fiscal burden on the cities, especially in the poor cities of the third world countries. Urban governments spend upto 15-25% of their annual budget on transport related costs [26].

In most cities of developing countries, passenger transport system is extremely inadequate. In India, traffic congestion and insufficient public transport facilities are the most *visible* problems encountered by the users and planners of the urban transport system. The traffic flow is severely hampered by the mix of slow and fast moving vehicles, heavy pedestrian traffic, encroachment of road space by hawkers, insufficient parking space and low proportions of urban land devoted to roads.

In face of the growing traffic congestion, it seems that road investments and motorized-traffic oriented management schemes are the only viable options for alleviating the passenger transport problems. Yet, experiences in the wealthy western cities have shown that it is not possible to design entirely congestion-free road

networks and transport facilities inspite of the availability of better technological know-how and relatively adequate financial resources. The emphasis of transport planning strategies is beginning to move away from capital investment towards control and constraint of traffic, based on administrative and pricing measures [66].

Whereas, in cities of the developing countries, transport planning is still primarily concerned with providing better facilities for the motorized traffic, despite the fact that more than half of all trips are on foot and other non-motorized modes. Most often, scarce financial and technical resources are diverted away from public transportation schemes which have the potential to benefit a much larger section of the urban society as compared to private automobiles. In a drive to increase road capacity, houses are demolished, and footpaths are narrowed which makes travel on foot more dangerous. Traffic management schemes generally tend to impose restrictions on the movement of non-motorized modes.

In most cities in India, private vehicle ownership levels are still extremely low and the carrying capacity of the public transport system is highly inadequate or it is not sufficiently developed. The mobility demands are generally met through intermediate modes of transportation, also known as informal or para-transit modes. Even in the large metropolitan cities, the percentage of all daily trips undertaken by modes other than autos or buses is quite high. In Calcutta, Bombay and Madras, nearly 58 percent, 48 percent and 44 percent of all trips are undertaken by modes other than cars or buses. In addition, this sector of transportation also provides employment to a large number of low-income, unskilled or low skilled people. Nearly 292 thousand residents of Delhi (5.8 percent of the total population), 90 thousand in Meerut (18 percent) and 38 thousand in Faridabad (19 percent), [57], owe their livelihood to the intermediate transport sector. In a survey of entrants to the city of Madras in 1979/80, it was found that at least 22 percent of those interviewed looked to employment in the informal transport sector. The rickshaw pulling industry alone

supports about 175,000 people in the city of Calcutta [4]. The informal/intermediate transport sector provides employment as drivers of various transport modes, and it also supports a large ancillary industry dealing in manufacturing of spare parts and repairs of vehicles.

The magnitude of shortages in the public transport system, the growing role of informal sector both in terms of satisfying the mobility needs and providing employment, and inadequate road capacity, calls for a detailed look at the process of urbanization and its implication on the mobility needs of the urban masses.

1.2 Objective of the study

The objective of this study is to examine the role of different passenger transport modes in cities of different sizes in India. A large variety of transport modes operate in cities in India, and they provide different types of services. The types of modes, their service and operating characteristics, and the market segment served by these modes often varies from city to city. The variations in the mix of passenger transport modes in different urban areas may be determined by a number of factors like population size, urban physical structure, and socio-economic characteristics of the residents. The pattern of trips undertaken by different segments of the society is governed primarily by the purpose of trip, destination, distance and time of travel and income of travelers. For this purpose, it is necessary to look at the process of urbanization in India, and identify its unique characteristics in terms of population and economic growth as these two factors directly influence the nature of travel demand. For example, travel trips generally increase with rise in income, and priorities accorded to different service qualities varies with different income groups. Density of population and their income levels also influences the availability and quality of transport service.

This study discusses the various modes of urban passenger transport in Indian cities within the framework of population growth, physical expansion of cities and occupational structure of the urban work force. The urban public transport modes are described, discussed and analyzed in the context of mobility needs of the large masses of urban poor and the under-employed. It describes the existing modes of transportation in six selected cities of different sizes, their patterns of growth, performance and operating characteristics. Also, the effect of personal vehicle ownership on the need for different types of public transport services is discussed. The emphasis is on the range of vehicles, their service characteristics and the pattern of use.

No original data was collected for the purpose of this study; secondary level data from various Indian and international studies has been used. The cities were selected in order to present a cross-section of the pattern of urban growth, level of passenger transport supply and the nature of mobility needs in cities of different sizes. The six cities are Hyderabad, Pune and Aurangabad in south India, and Kanpur, Meerut and Faridabad in northern India. The size of their population varies from 1.79 million in Hyderabad to 0.12 million in Faridabad. It is important to view the nature of road network and the multiplicity of vehicles on these roads in the context of historical growth of these cities because of the impact of these factors on present and future planning decisions. Meerut, Hyderabad and Kanpur are old cities, considering that they were classified as urban areas even during pre-colonial period. Pune developed during the British period when it gained prominence as a major military establishment. Aurangabad and Faridabad have developed as industrial centers during the last ten to twenty years only.

The study has been organized in the following manner: First, the contextual macro-level framework of urban population growth and urban economy in India has been presented; the urban economy has a preponderance of informal or the non-

established sector. Chapter 2 presents an overview of the pattern of urban settlements and their mobility needs during pre- and post-independence periods in India. Chapter 3 briefly describes the levels of urbanization and the nature of economic growth, and its implication on employment and occupational structure in selected cities. Chapter 4 presents the range of passenger transport vehicles in India, both personal and public vehicles, and the service characteristics of each together with user charges on different public transport vehicles. Next, the micro-level study of the socio-economic characteristics of six cities of different sizes in India has been discussed in Chapter 5. Passenger transport characteristics and the importance of different modes in each of these cities is presented in Chapter 6. Chapter 7 discusses the major urban passenger transport issues based on the analysis of the information presented in the preceding chapters. Finally, Chapter 8 presents conclusions and recommendations for the planning of passenger transport modes based on the issues discussed in Chapter 7.

Chapter Two

Urban Settlements: An Overview

In order to understand the problems and inadequacies of passenger transport facilities in the cities of the third world today, one must look at the historical physical lay-out of the cities in the context of their socio-religious, political and economic activity centers. In India, cities with pre-British origins show a striking contrast between the indigenous part and the colonial part of the urban settlement. A typical Indo-British city consists of a congested old section which have mixed residential and commercial land uses, adjacent to which is generally found carefully planned and spacious sections developed during the British period.

2.1 Indigenous Urban Pattern

In old cities with distinctive Indian characteristics, the streets are irregular in pattern, narrow and crooked. The main vehicular traffic thoroughfares are rarely more than twenty-five to thirty feet in width, often without sidewalks, and encroached upon by booths and the projecting open fronts of the shops which line them. The side streets and alleys are usually much narrower, almost impassable for motorized vehicles.

The main bazaar of the city, called *chowk*, is not quite equivalent to the central business district of a city in the western countries. It is crowded with innumerous small retail shops which deal in food, cloth, hardware, jewelry, and other consumer goods. Groups of competing merchants tend to occupy a particular section of the bazaar. Thus, there may be a bazaar for grain merchants and perhaps another for green grocers, one for brassware and still another for pottery. Native bankers and money-lenders also congregate in the vicinity of the central bazaar. Sometimes they

occupy the second floor rooms above the shops. Often, the upper and rear rooms of the shops are used as dwelling places for the merchants and their families. Retail business establishments generally extend a mile or two along main traffic arteries. Subsidiary bazaars develop as the city grows.

The commercial streets in these cities are surrounded by very high density residential neighborhoods. The residential areas are often segregated by caste and religion.

Although segregation by commodity in business areas and by caste and religious groups in residential areas is common in these cities, no clear cut separation exists between residential land use from business or industrial use. As mentioned earlier, merchants live in the bazaars, over or behind their shops; service industries and manufacturing of all kinds are located in predominantly residential areas. In some sections of the city, manufacturing and retail or wholesale trade are carried out in the same establishment.

2.2 Colonial Urban Pattern

In contrast to the pattern of the indigenous urban settlements, the former British military cantonments, civil lines, and railway colonies were laid out with preconceived plans which have definite functional areas. The streets are broad, metalled or paved, and shaded with trees in a boulevard style of western Europe. The buildings are set well back and the streets have broad side-walks. The colonial areas of the city have the public institutions like the public libraries, hospitals, post and telegraph offices, schools and colleges and recreational areas like the gymkhana, hotels and cinema houses, all of which were originally established for the benefit of the British governing class.

2.3 Urban Transport Patterns in the Pre-independence Period

The pre-independence city in India was characterized by separate development of indigenous and colonial areas, The level of infrastructural facilities in the different sections of the same city is an excellent example of favored growth and development. The indigenous areas had very high population density and low levels of basic amenities; in contrast, the colonial areas had low density developments with very good infrastructure provision. Primary and secondary roads within the latter areas, were both well planned and well maintained, and provided good access to the larger road and rail network of the city. Its business and administrative centers were especially well connected.

The majority of native population depended on economic activity within the indigenous areas for their sustenance, and moved around primarily on foot and bicycles. Only the more well-to-do in the community who had business links with the colonials traveled to the colonial commercial areas. But due to natural growth in population and migration from rural areas, congestion in both living and movement space accelerated. Also, in order to benefit from the ease of accessibility, the activity centers of the indigenous population slowly mushroomed on either side of the major arterial roads and the railway lines. But it did not immediately increase the journey-to-work movements as area for expansion was limited and economic activity was highly concentrated spatially. The mobility problems intensified with the increase in motorization levels, as traders hired lorries to bring in the goods from outside. Motorized and non-motorized transport services became more common as the population grew, and the colonials opened up more administrative, service and business areas for the local elite to participate in. Figure 2-1 depicts the typical tripartite configuration of urban settlements in pre-independence cities of India and Figure 2-2 shows the dominant movement patterns during that period; characterized by separate residential and activity centers of the indigenous and the colonial population [4].

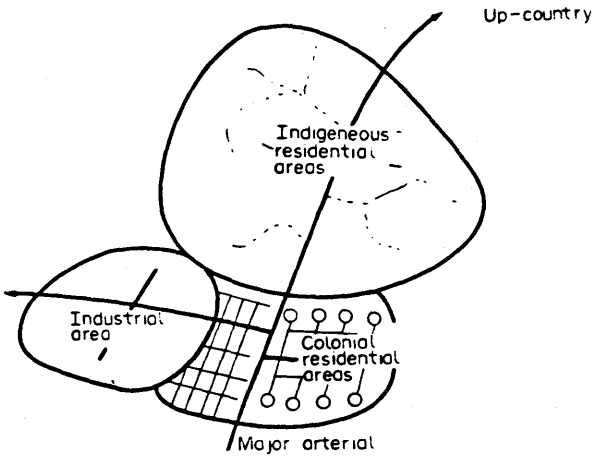

Figure 2-1: Configuration of urban settlements in pre-independence cities

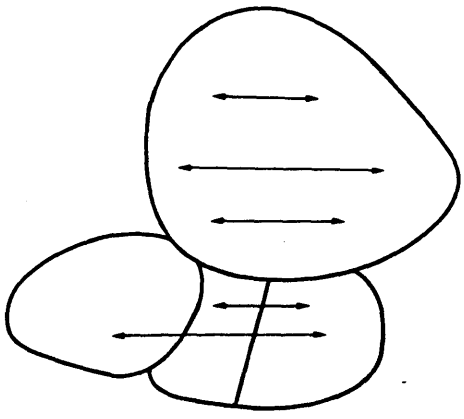

Figure 2-2: Pattern of mobility in pre-independence cities

2.4 Urban Transport Patterns in the Post-independence Period

As India approached independence, more and more Indians were assimilated into the roles and functions to be left vacant by the departing colonialists. Soon after independence, high government officials and business elites moved into the residential and commercial areas previously occupied by the colonials. New movement patterns emerged which broke the previous socio-economic and cultural divisions within the city. Increased car-ownership levels among the new elites further facilitated travel; the informal modes of public transport system began to operate a city-wide service. Figure 2-3 depicts the dominant movement patterns in the post colonial period.

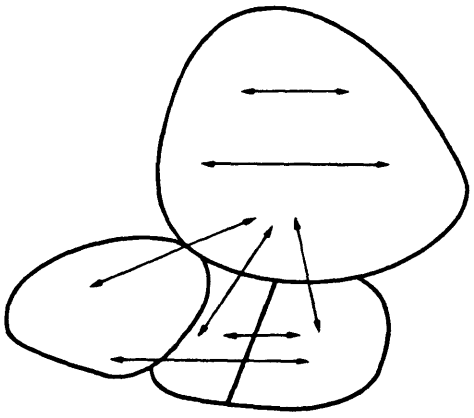

Figure 2-3: Pattern of mobility in post-independence cities

The new urban movement patterns generated new travel demands, which together with increased migration from rural areas put severe pressure on the urban form and the transport system. With the increase in traffic volume, major road intersections started becoming very congested and traffic was interrupted for long periods of time at points where the roads crossed the railway lines. A general relaxation of traffic

regulations, parking restrictions and land-use controls, due to overall drawbacks in law enforcement capabilities of the local administration further compounded the problems of urban mobility.

2.5 Post-independence Strategy for Urban Planning

India inherited an economic and socio-political system which could not respond readily and efficiently to the challenge of correcting the imbalances of the colonial period. Scarce economic resources had to be diverted towards the development of high priority sectors of the economy, i.e. agriculture and industry. Because of a highly centralized spatial economy, increased emphasis on industrialization led to increased migration from the rural areas to large industrial urban centers.

During the fifties, the plight of the traditionally built core areas of large cities was already deplorable; they were crowded, congested and lacked essential urban services. It was not until the Third Five-Year plan (1961-66), that any serious effort was aimed towards the solution of urban problems based on systematic urban planning. Preparation of 'master development plans' for major metropolitan cities, state capitals, port and industrial towns was taken up with hundred percent central government assistance. However, this approach had several drawbacks:

1. Sufficient financial resources were just not available with the state governments to undertake programmes envisaged in the master development plans.

2. Master plans did not propose any significant programmes for ameliorating the living conditions in the older areas of the city. Also, it did not recognize the contribution of the unorganized/informal sector in the economic life of these cities.

3. The plans generally failed to recognize the large variation and diversity in the life styles and living conditions within the cities.

4. Master plans were based on sophisticated projections of future growth rates and urban requirements; in the process it practically ignored the present realities of housing congestion, slums and traffic bottlenecks.

The result of this planning exercise was more or less futile as programmes in the master plans could not be implemented primarily due to paucity of resources. In the meantime the deterioration in urban environment became extremely alarming.

Chapter Three

Urbanization and Economic Growth

The majority of urban trips in India are work-related; it is therefore important to develop the contextual framework for the evaluation of transport and mobility needs of the urban population as related to their pattern of employment and economic growth. In this chapter, we will discuss the rate of urbanization and economic growth, and the nature of occupational structure in cities in India. The discussion will be supported with data on population and economic growth, and employment structure from selected Indian cities of different sizes.

3.1 Levels of Urbanization

The census of India has classified all urban areas into six different classes (I - VI) according to the size of their population.

The provisional population totals of the 1981 census reveals that approximately 156 million people (about 23.7 percent of the total population) live in 3245 cities and towns ranging in population from 9 million to less than five thousand [39, 40]. Over a period of last fifty years (1941-81), the net increase in India's population has been about 112 million, of which nearly 50 million was added during the last decade only. See Table 3-1.

Table 3-2 reveals the magnitude of people living in Class I cities in India; nearly 60 percent of the total urban population in 1981 resided in about 216 Class I settlements. The growth rate per year in these cities has been over 4 percent for the last twenty years; Class I cities experienced the highest growth rate among all other classes of cities (except class VI in period 1971-81).

Year	Number of Towns	Total Urban Population (millions)	Level of Urbanization (%)	Annual Growth Rate (%)
1941	2210	43.6	14.1	2.82
1951	2844	61.6	17.6	3.52
1961	2330	77.6	18.3	2.34
1971	2531	107.0	20.2	3.26
1981	3245	156.2	23.7	3.86

Source: Rakesh Mohan and Chandrashekhar Pant, *Morphology of Urbanization in India* [39].

Table 3-1: Growth of urban population in India, 1941-81

Tables 3-3 and 3-4 show the pattern of population growth among class I cities during the decades 1961-71 and 1971-81 respectively. Interestingly, the 4 million plus cities (Bombay and Calcutta) had the lowest growth rate among all Class I cities, slightly below 3 percent per annum during the last two decades. Cities with population between 1-4 million experienced the highest annual growth rate (4.14 percent) during the decade of 1961-71, and it was second highest (3.99 percent) in the last decade (1971-81).

The magnitude of urban population in million plus cities is absolutely staggering. It emphasizes the enormity of the task of providing basic infrastructural facilities, like water supply, sanitation, sewerage and transportation, in these cities. In 1971, about 25 million people lived in these cities, and by 1981, the number had swelled to about 38.7 million, which is approximately 25 percent of the total urban population. In fact, the population of class I cities (about 85 million) accounts for over half of the total urban population of India in 1981.

Town Classification	1961 (%)	1971 (%)	1981 (%)	Annual Growth Rate (%) 1961-71	1971-81
ClassI (100,000 +)	50.8 (102)	56.2 (145)	60.4 (216)	4.32	4.60
ClassII (50,000 - 100,000)	11.0 (129)	11.2 (178)	11.6 (270)	3.49	4.22
ClassIII (20,000 - 50,000)	17.4 (449)	16.3 (570)	14.4 (739)	2.60	2.53
ClassIV (10,000 - 20,000)	13.0 (732)	11.2 (732)	9.5 (1048)	1.74	2.18
ClassV (5,000 - 10,000)	7.0 (739)	4.6 (641)	3.6 (742)	-1.09	1.45
ClassVI (less than 5,000)	0.8 (179)	0.5 (150)	0.5 (230)	-2.18	4.86
Total Urban Pop. (millions)	104	39.7	55.5	3.43)	

Source: Rakesh Mohan and Chandrashekhar Pant, *Morphology of Urbanization in India* [39].

Table 3-2: Distribution of urban population by city size, 1961-81

City Size	Number of Towns 1961	Population in 1961 (millions)	Population in 1971 (millions)	Annual Growth Rate (1961-71) (%)
4 million +	2	9.9	13.0	2.82
1 - 4 million	5	7.9	12.0	4.14
1/2 - 1 million	5	3.6	4.8	2.82
250,000 - 500,000	21	7.4	10.3	3.35
100,000 - 250,000	71	10.8	15.5	3.71
Total	**104**	**39.7**	**55.5**	**3.43**

Source: Rakesh Mohan and Chandrashekhar Pant, *Morphology of Urbanization in India* [39].

Table 3-3: Pattern of growth of Class I cities, 1961-71

City Size	Number of Towns 1971	Population in 1971 (millions)	Population in 1981 (millions)	Annual Growth Rate (1971-81) (%)
4million +	2	13.0	17.4	2.95
1 - 4 million	7	14.4	21.3	3.99
1/2 - 1 million	10	6.8	8.9	2.93
250,000 - 500,000	33	12.0	17.9	4.04
100,000 - 250,000	93	14.0	20.3	3.79
Total	145	60.1	85.8	3.62

Source: Rakesh Mohan and Chandrashekhar Pant, *Morphology of Urbanization in India* [39].

Table 3-4: Pattern of growth of Class I cities, 1971-81

3.2 Contribution of Different Sectors to the Growth of India's Economy

Experiences in urbanization and economic growth in different parts of the world, especially in the industrialized countries of the west and more recently countries in the far east, suggest three main characteristics of urbanization [6]:

1. The change in the level of urbanization is generally accompanied by the change in the structure of economic activity from primary to secondary and tertiary sectors.

2. The urban population and national income generally maintain a direct relationship in their pattern of growth.

3. The urban population and industrial production, also, generally maintain direct relationship in their growth patterns.

The process of urbanization and economic growth that deviate from the above mentioned pattern is generally considered to be incongruent. In India, the nature of urban economic activity seems to have deviated from the expected pattern of growth as evidenced in other urbanizing economies.

The census of India classifies all economic activities into nine categories:

1. Cultivators

2. Agricultural Laborers

3. Livestock, Forestry and Fishing etc.

4. Mining and Quarrying

5. Manufacturing Processes (includes household industry and other industry)

6. Construction

7. Trade and Commerce

8. Transport, Storage and Communication

9. Other Services

Of these, the first four categories are classified as the *primary sector*, number five and six as the *secondary sector* and the remaining as the *tertiary sector* of the economy.

Table 3-5 shows the percentages of urban population to the total population from 1901 to 1981, the distribution of workers by major sectors of the economy and the contribution of each sector to the national income [6].

During the past seventy years (1901-71), the share of the urban population to the total population has increased from 10.8 percent to 19.9 percent but the structure of the working force involved in different sectors of the economy has remained more or less stagnant. In 1901, when the proportion of urban population was only 10.8 percent, approximately 71.8 percent of the total workforce was engaged in the primary sector. In 1971, the share of urban population increased to 19.9 percent but the proportion of workers in the primary sector remained at about 72.6 percent. The share of the secondary sector showed a declining trend from 12.5 percent in 1901 to 10.7 percent in 1971; tertiary sector registered only a marginal increase, from 15.7 percent in 1901 to 16.7 percent in 1971.

Although this data may suffer from some limitation due to changes in the definition of *workers* at different census points, the significant fact still remains that the process of diversification of economic activities has not taken place in any perceptible manner.

The relative contribution of different sectors of the economy to the national income presents an interesting picture. The share of the primary sector in the national income decreased from 66.3 percent in 1901 to 44.1 percent in 1971, whereas the share of the

	1901	1931	1951	1961	1971
Total Urban Population (Percentage of total population)	10.8	12.0	17.3	18.0	19.9
Workers in Primary Sector (Percentage of total workers)	71.8	75.1	72.7	72.3	72.6
Workers in Secondary Sector (Percentage of total workers)	12.5	9.9	10.1	11.7	10.7
Workers in Tertiary Sector (Percentage of total workers)	15.7	15.0	17.2	16.0	16.7
Percentage of national income contributed by the Primary Sector	66.3	51.7	49.1	46.3	44.1
Percentage of national income contributed by the Secondary Sector	11.7	15.9	16.7	16.6	23.2
Percentage of national income contributed by the Tertiary Sector	22.0	32.4	34.2	37.7	32.7

Source: Gopal Bhargava (editor), *Urban Problems and Policy Perspectives* [6].

Table 3-5: Percentage of urban population and distribution of workers and products by major sectors of economy in India, 1901-1971

secondary sector increased from about 11.7 percent to 23.2 percent during the same period. Similarly, the share of tertiary also increased from 22 percent in 1901 to 32.7 percent in 1971. Unlike the distribution of work force, this change in the structure of the economy, i.e. the contribution of different economic sectors to the total national income, emphasizes the change in sectoral production process; noticeable diversification is observed in favor of secondary and tertiary sectors.

According to Bhargava, the per capita income[1] at constant prices (1950-51) was Rs.306 in 1961, which increased to about Rs.339 in 1971, i.e. about 10.8 percent growth during the decade of 1961-71. Whereas the growth rate of urban population during the same decade was about 38.2 percent. A sizable gap between the rate of economic growth and urbanization is observed.

3.3 The Nature of Urban Economy

The economic base of urban settlements in India is extremely weak as evidenced by the low level of participation in the secondary sector, only 10.7 percent of the total population in 1971 (see Table3-5). According to Mallick [6], as per 1971 census, large number of economic establishments used no electric power at all for production purposes. The proportion of such establishments was about 80 percent in Madras, 75 percent in Bombay, 83 percent in Calcutta, 89 percent in Bangalore and about 90 percent in Ahmedabad. The proportion of units with five or less number of workers was found to be about 87 percent in Madras, 84 percent in Bombay, 82 percent in Calcutta and 95 percent in Ahmedabad. This data enumerates the low level of technology employed for manufacturing purposes; its effects are felt on the level of production and *income* of workers involved in low technology industries.

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[1] Exchange rate: US $1 = Rs.8.00 approx. in 1970's and Rs.12.00 approx. in 1980's

As regarding income of people in large cities, nearly 63 percent of the people in Calcutta metropolitan district had incomes less than Rs.300 (1977); in Delhi, 71 percent of households in squatter settlements had incomes less than Rs.250.

The socio-economic status of the urban population in large cities tells the sad story of urban poverty. De Souza [6] has given some data on slum settlements, taken from several different studies, in his article. In Bombay, about one-half (4 million) of the population lived in slums in 1981; in Madras nearly 33 percent of the population was in slums in 1971; in Ahmedabad, 25 percent of the population lived in 400 *pols* within the walled city where the density can be as high as 1000 persons per acre; in Calcutta, nearly 2.5 million lived in slums in 1977.

The urban occupational structure is also characterized by the preponderance of the tertiary sector, and heavy concentration of people in this sector reveals the problem of under-employment in urban India. The next section of this chapter discusses the levels of employment, occupational structure and the ratio of established and non-established sector in selected Indian cities of different sizes.

Weakness of the urban economic base is a major factor in perpetuating the low levels of urban income and brings us to the most important question of *affordability* of basic urban services, including transportation, by the majority of the urban residents. This has major repercussions in terms of paucity of resources available to local authorities responsible for providing basic urban amenities.

3.4 Employment and Occupational Structure in Selected Cities in India

The bulk of economic activities and employment opportunities are concentrated in few urban areas in India. Out of a total of 32.01 million urban workers in 1971, about 56.76 percent were accounted for by Class I cities alone [6]. The combined share of

Class IV-VI cities and towns was only 16.49 percent. Similarly, Class I cities maintained a very large share of urban workers engaged in industry (66.63 percent), and trade and commerce (58.03 percent) in 1971.

With the growth of population in large cities, the total number of workers has also increased considerably. But a point of worry is that the workers' participation rate has been slowly declining in most large cities, i.e. the rate of unemployment is rising.

As regarding labor force composition in various sectors of the economy, the selected cities present a mixed picture (refer to Table 3-6). As expected, the share of the primary sector is almost negligible. The share of the secondary sector varies from about 27.43 percent in Lucknow to 48.19 percent in Bombay. But in 1971, the five largest cities, Calcutta, Bombay, Delhi, Madras and Hyderabad, and Pune were the only ones which experienced growth in manufacturing industries as compared to 1951 and 1961. All the others experienced a decline in workers' participation rate in the secondary sector during the same period.

In the tertiary sector, the rest of the cities, except Pune, had a larger percentage of workers in this sector in 1971 as compared to 1951 or 1961. The category 'other services' refers primarily to administrative and government jobs, and is generally included in the tertiary sector; but it has been presented separately for the present discussion because the distinction between trade and commerce from administrative services is important, the former represents a large percentage of informal sector activities, and the later represents public sector formal employment. The workers' rate of participation in this sector has declined in almost all cities in 1971 over 1961 and 1951, with the exception of Kanpur and Lucknow. Table 3-6 also reveals that in cities like Calcutta, Madras, Hyderabad, and Lucknow, the tertiary sector accounts for the largest percentage share of workers among all sectors.

City	Primary Sector (%)	Secondary Sector (%)	Tertiary Sector (%)	Other Services (%)
Calcutta	0.56	35.64	41.26	22.54
Bombay	1.13	42.84	31.46	15.81
Delhi	1.54	28.31	30.25	32.74
Madras	1.16	23.90	31.79	14.08
Hyderabad	3.00	28.70	37.90	33.40
Bangalore	1.47	33.74	27.61	19.82
Ahmedabad	1.63	49.80	26.90	18.80
Kanpur	3.86	38.95	32.26	31.16
Pune	3.86	36.58	30.30	29.26
Meerut	4.49	27.39	28.69	39.43

Source: Ashok Mitra, Shekhar Mukherji and Ranendranath Basu, *INDIAN CITIES: Their Industrial Structure, Immigration and Capital Investment, 1961-71* [36].

Table 3-6: Composition of male workers in different economic sectors in selected cities in India, 1971

City	Population in 1971 (millions)	Total Labor Force (%)	Total Workers (%)	Workers in Estab. Sector (%)	Workers in Nonestab. Sector (%)
Calcutta	7.03	62.2	32.62	37	63
Bombay	5.97	63.7	36.9	69	31
Delhi	3.65	60.5	30.7	60	40
Madras	3.17	59.3	28.4	33	67
Hyderabad	1.79	55.9	26.7	51	49
Bangalore	1.65	58.2	29.7	48	52
Ahmedabad	1.59	57.1	27.9	45	55
Kanpur	1.28	56.9	29.3	62	38
Pune	0.86	n.a.	29.2	n.a.	n.a.
Meerut	0.37	52.8	27.8	30	70
Aurangabad	0.17	n.a.	25.6	n.a.	n.a.
Faridabad	0.08	58.3	33.3	55	45

Source: *Report on Objective Assessment of the Role of Intermediate Transport in Cities of Different Sizes*, School of Architecture and Planning, New Delhi [57].

Table 3-7: Percentage of workers in the established and non-established sector of the economy in selected cities in India, 1971

Table 3-7 reveals some interesting data on the percentage of workers in the established and the non-established/informal sector of the economy in selected cities in India. In all the cities listed, nearly one-third of the urban workers are engaged in the informal sector. Meerut, Madras and Calcutta respectively have about 70, 67 and 63 percent of their workers in the informal sector which speaks very eloquently about the nature of urban economy in these cities. This table also gives data on the total labor force and workers (column 3 and 4) as percentage of total urban population.

The vast gap between the percentage of total labor force and total workers reveals the levels of shortages in employment opportunities.

In conclusion we can say that most large cities in India are growing at quite a fast rate. But large percentage of urban labor force is engaged in the informal sector which is characterized by low wages, unskilled labor and low productivity. As the bulk of migrant labor from rural areas is generally illiterate with low levels of skills, they further perpetuate the poverty-induced and population-growth induced non-established sector.

The phenomena of unemployment and under-employment has direct bearing on several aspects of urban physical planning:

1. Unemployment and under-employment forces people to live in high density squatter settlements as they are unable to afford anything better.

2. The basic civic amenities like water, sanitation, transportation, etc. are under severe strain due to rapid population increase in urban areas.

3. The large masses of urban population who are unemployed or under-employed are unable to contribute towards city's' financial resources (reflected through low tariffs for basic urban infrastructure facilities, e.g. water, sanitation, property tax, transport fares, etc.); consequently, these cities have an extremely poor financial base. In most cases, resources are not adequate even to maintain and manage the vast network of existing infrastructural facilities, leave alone the construction of new facilities that are urgently required to meet the growing demand.

Chapter Four

Types of Passenger Transport Vehicles in India

Passenger transport vehicles in India come in various sizes and seating capacity. They employ different technologies for propulsion, and accordingly, provide different levels of service. Passenger transport vehicles can be broadly classified into two categories:

- *Personal* vehicles that are privately owned and operated by individuals or families.
- *Public* vehicles that are available on hire for the use of any person or persons. They may be privately owned or owned by the government, and are operated for the use of the general public.

4.1 Personal Modes of Transportation

In most cities in India, **walking** is still the predominant mode of transportation. It is quite common to cover a distance of one to five kilometers on foot.

Bicycles are the most popular modes of transportation among the lower and middle income households for work and education related trips. India is perhaps the largest manufacturer of bicycles in the world. New bicycles may cost around Rs.400 to Rs.500, and generally last for over twenty years with minimum maintenance. Bicycles are used as family vehicles in small cities and rural areas. It is quite common to find two people riding a bicycle; an adult passenger generally sits on the luggage carrier rack behind the driver, and/or a young child may be carried in a basket attached to the bicycle frame in front of the handle bar. In suburban and rural areas, bicycles are also used extensively for transporting goods over short distances. Bicycles are most

appealing because apart from the initial investment, they require no operating expenditure and very little maintenance.

Motorcycles/Scooters/Mopeds are the family vehicles for the upper-middle and higher income class of the population. They are used extensively for journey to work. The cost of a new motorcycle or scooter may vary from Rs.12,000 to Rs.18,000. Mopeds are considerably cheaper but can carry one person only. Whereas, scooters and motorcycles routinely carry two passengers, and sometimes a family of four is also seen riding a scooter. All the three vehicles are manufactured in India.

Car ownership is very low even in the large metropolitan cities in India. The cost of cars range from Rs.50,000 to Rs.100,000, and the operating cost in terms of fuel and maintenance is quite high. Although there are very few cars per 1000 person population, their contribution to traffic congestion is quite significant.

4.2 Public Modes of Transportation

Public Transportation modes in India can be classified into two categories based on the type of service provided by them:

- *Taxi-like services*, transportation modes that provide service for 'one party' of traveler/s at a time between origin and destination determined by the traveler/s. They generally provide door-to-door service.

- *Bus-like services*, transportation modes that provide 'collective' services between fixed origin and destination points, on a fixed route with predetermined stops in between to allow passengers to board and unboard the vehicle.

Fare is fixed and/or graded according to the distance traveled on bus-like services. Fare for taxi-like services is 'metered' or fixed by bargaining between the operator and the passenger. Generally, the fare for taxi-like services is considerably higher

than that for bus-like services, because the former provides a higher level of service in terms of comfort and door to door service. In Indian cities, certain vehicles that have been licensed to operate taxi-like services illegally operate bus-like services during peak travel periods.

Another common terminology in use to describe privately owned and publicly operated transport services is *Intermediate Public Transport* or IPT. Any public transport service that falls outside the set up of large, organized transport company or enterprise is referred to as IPT service. Additionally, there is complete freedom of entry and exit of service operators in the IPT sector. In the Indian context, any service other than the conventional standard bus transport is commonly referred to as IPT service.

In million plus cities, with the exception of Kanpur, **standard buses** are the dominant mode of public travel. Standard bus services in all Indian cities (where ever they exist) are operated by government owned bus companies. The carrying capacity of buses varies from 40 to 70 depending on the model and size of the bus, but due to high level of demand and inadequate capacities, standard buses quite often carry 100 to 120 passengers per bus during peak travel periods. The two most common models of standard buses operating in Indian cities are shown in Figures 4-1 and 4-2. Figures 4-3 and 4-4 show the overcrowding on these buses. Standard buses are manufactured in India.

Standard buses owned by the private sector are licensed to operate **contract service** only. In this case, a group of individuals enter into a contract agreement with the bus operator, and the later provides services between fixed origin and destination on the basis of monthly fare. Generally, this type of service is operated during peak periods in peak direction only. Another variation of contract bus service is the **company bus service**. In this case, a large office or factory, either owns the bus or contracts with a

Figure 4-1:Standard single-deck Tata bus

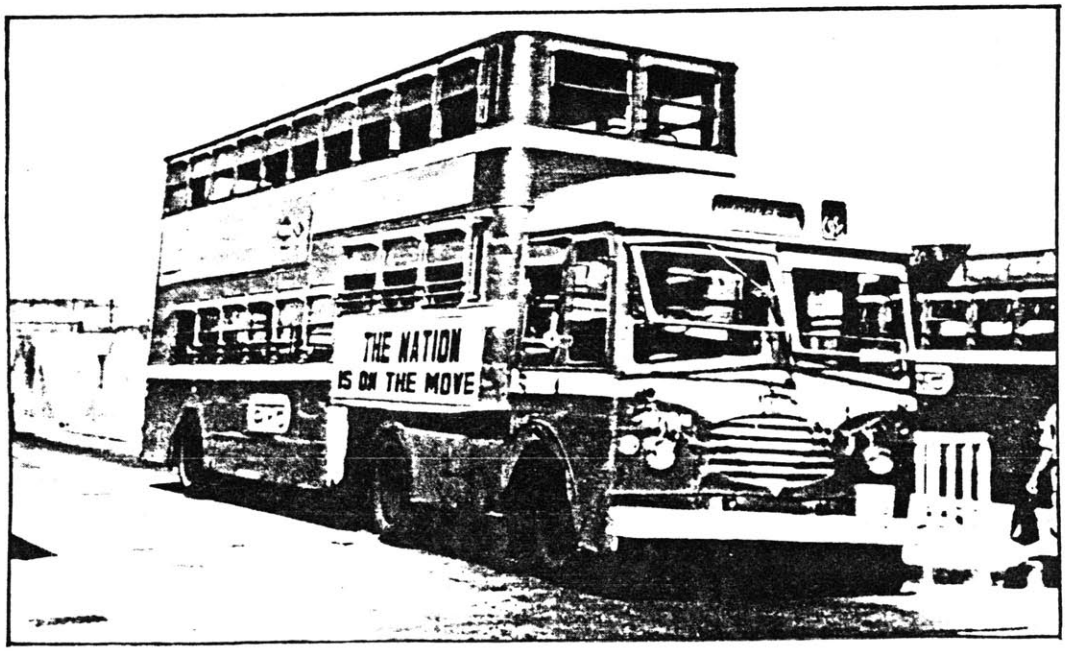


Figure 4-2:Leyland semi-articulated, double-deck bus

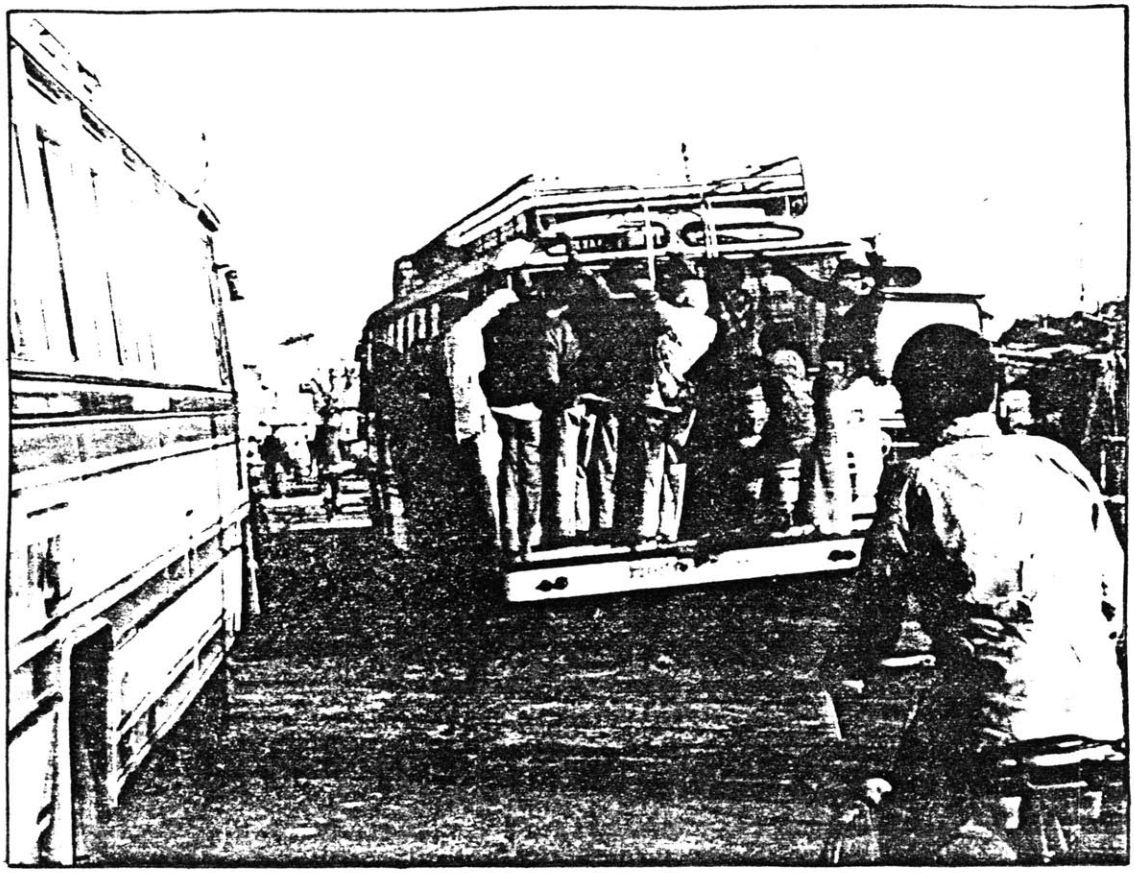


Figure 4-3:Passengers clinging to the back of the bus whilst in motion

Figure 4-4: Passengers trying to board a bus

private operator to provide the bus transport service to workers between the place of residence and work. Generally, the cost of company bus services are borne by the company or factory that operates the service. Sometimes, employees may be charged a nominal amount.

In all cities, except Bombay, standard bus services are complimented by various forms of IPT services. The most common forms of IPT modes in Indian cities are:

- **cycle-rickshaws** (see Figure 4-5);
- **auto-rickshaws** (see Figure 4-6);
- **horse-driven tongas** (see Figure 4-7);
- **minibuses**(see Figure 4-8);
- **auto-taxis** (see Figure 4-9).

IPT services are owned and operated entirely by the private sector. Figure 4-10 shows the use of cycle-rickshaw as a 'school-bus' to transport six to eight small children to school. This is a very common use of cycle-rickshaws in all cities.

The **suburban railways** are limited to the metropolitan cities only. Their role in the total public transport system is quite significant in Calcutta, Bombay and Madras, where nearly 25%, 55% and 25% (respectively) of all mass transit trips are by suburban railways. Additionally, Calcutta is the only city where tramways are still in operation.

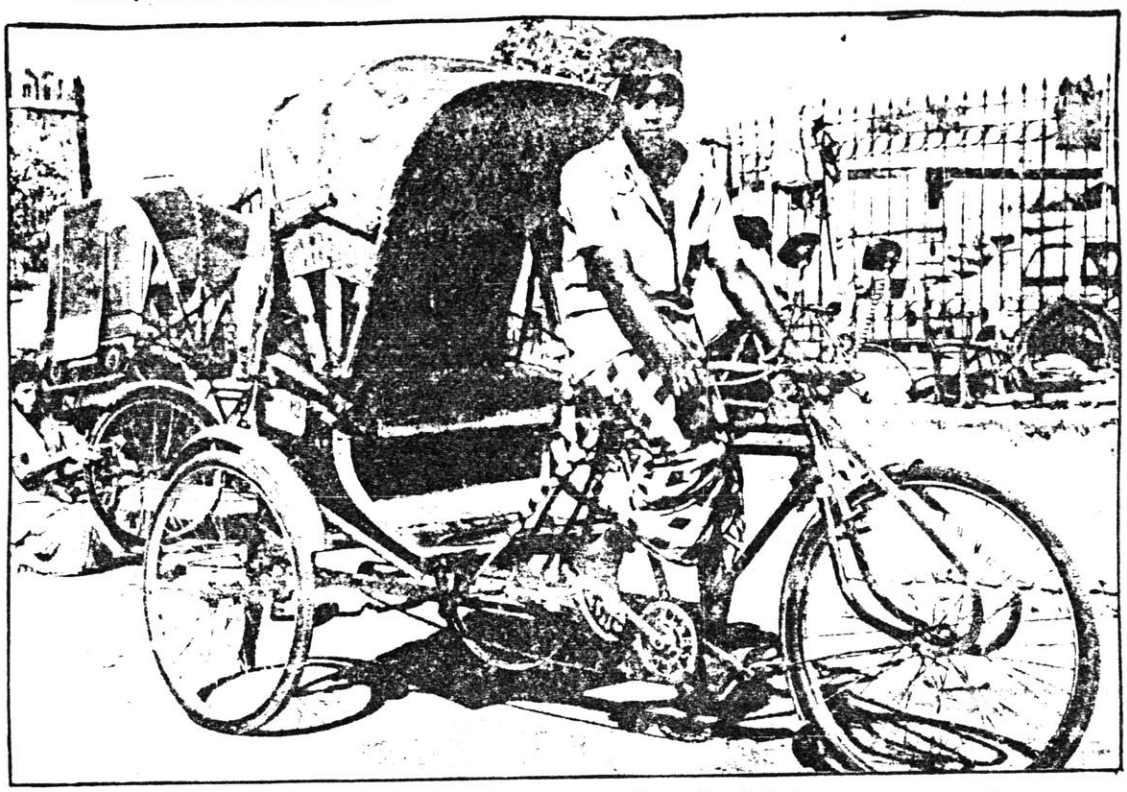


Figure 4-5:Human powered cycle-rickshaw

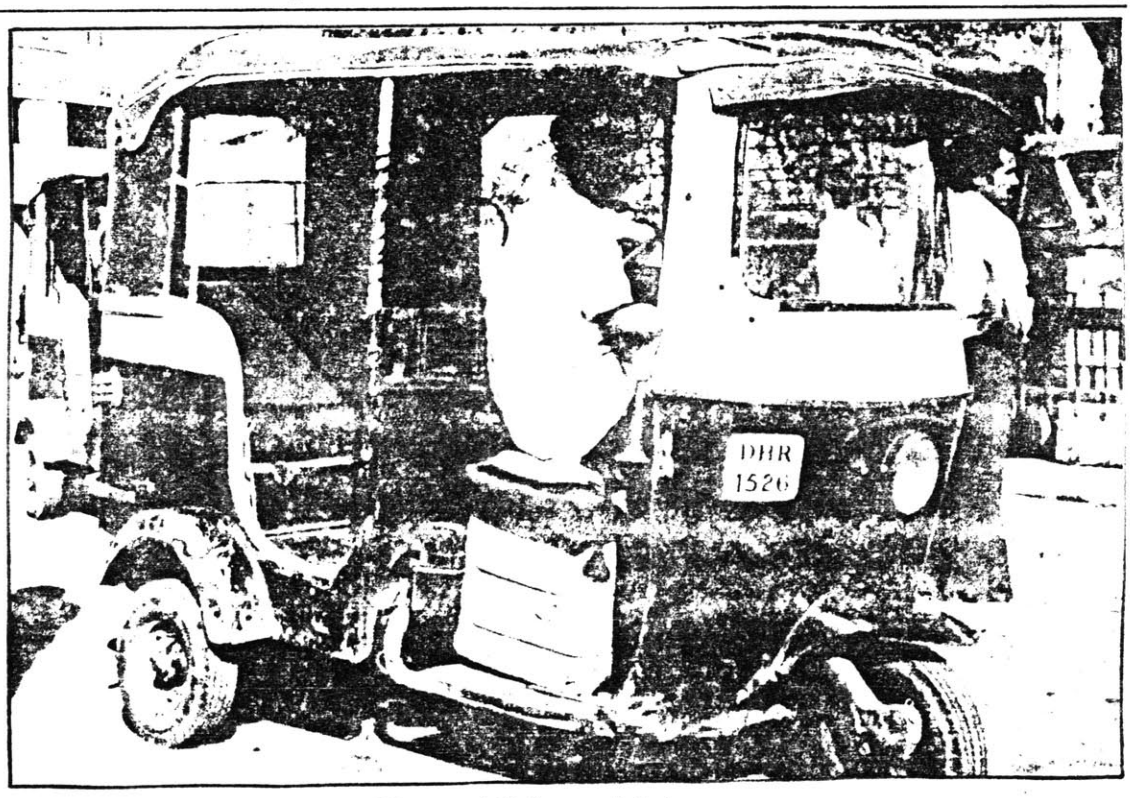


Figure 4-6:Auto-rickshaw

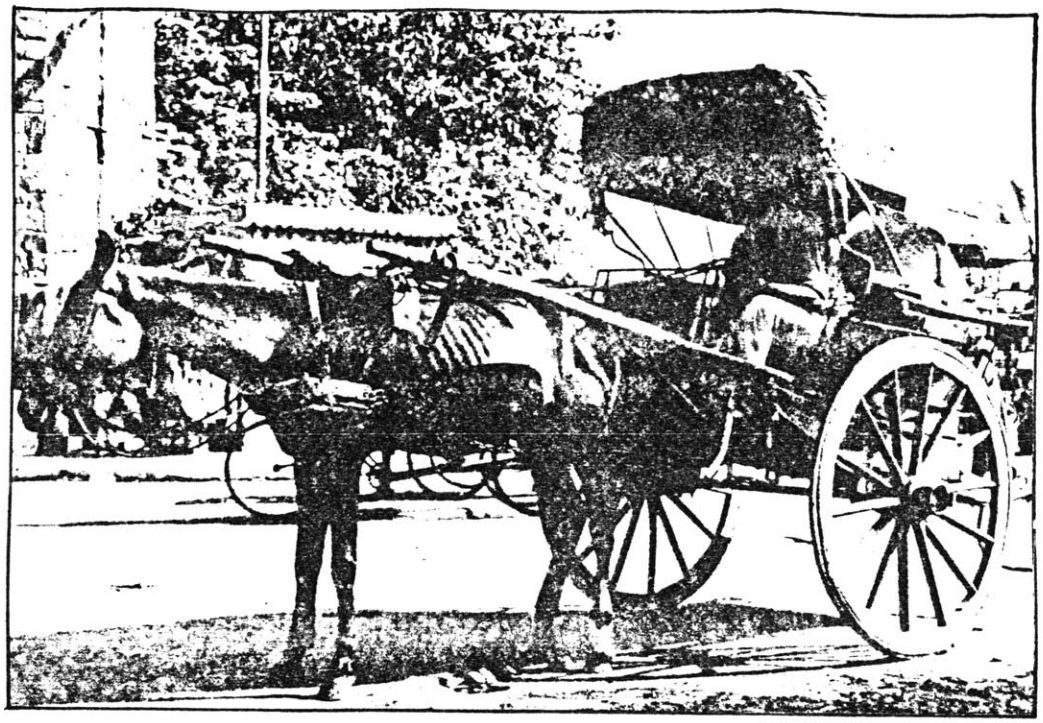


Figure 4-7:Horse-drawn tonga

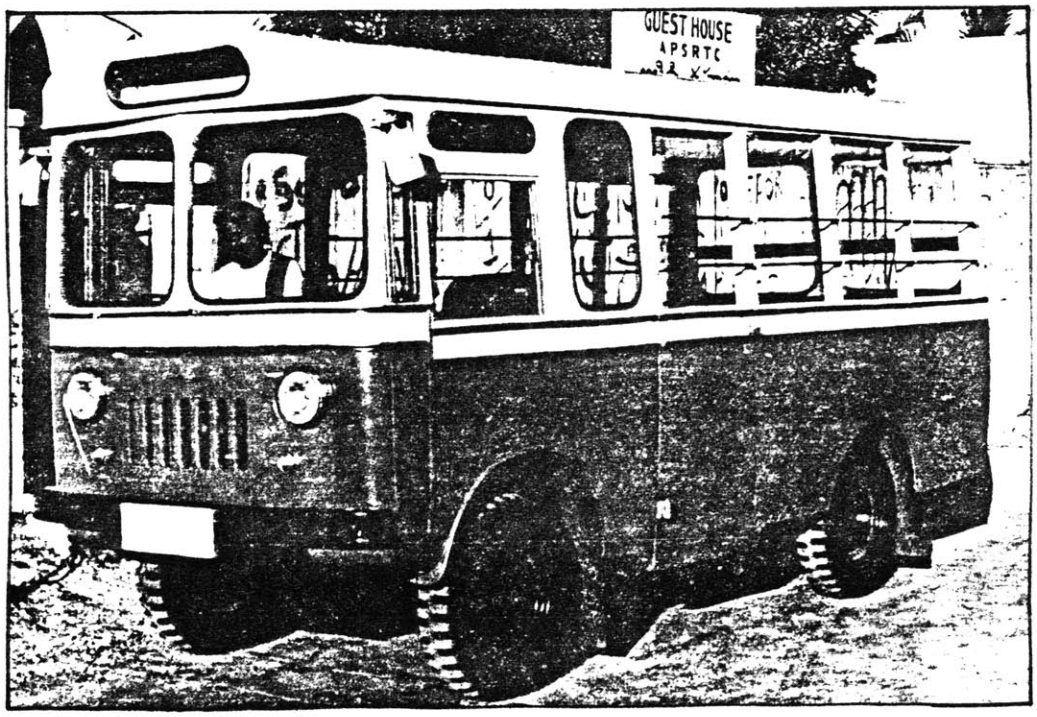


Figure 4-8:Minibus

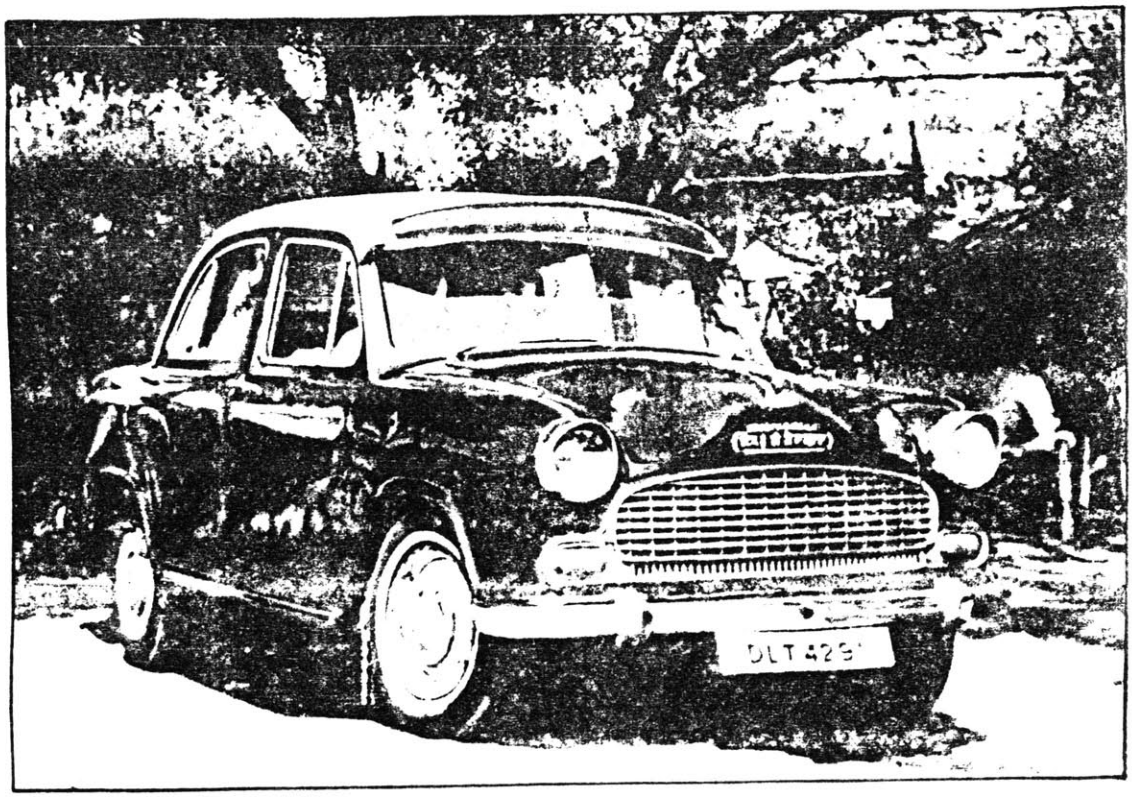


Figure 4-9:Taxi

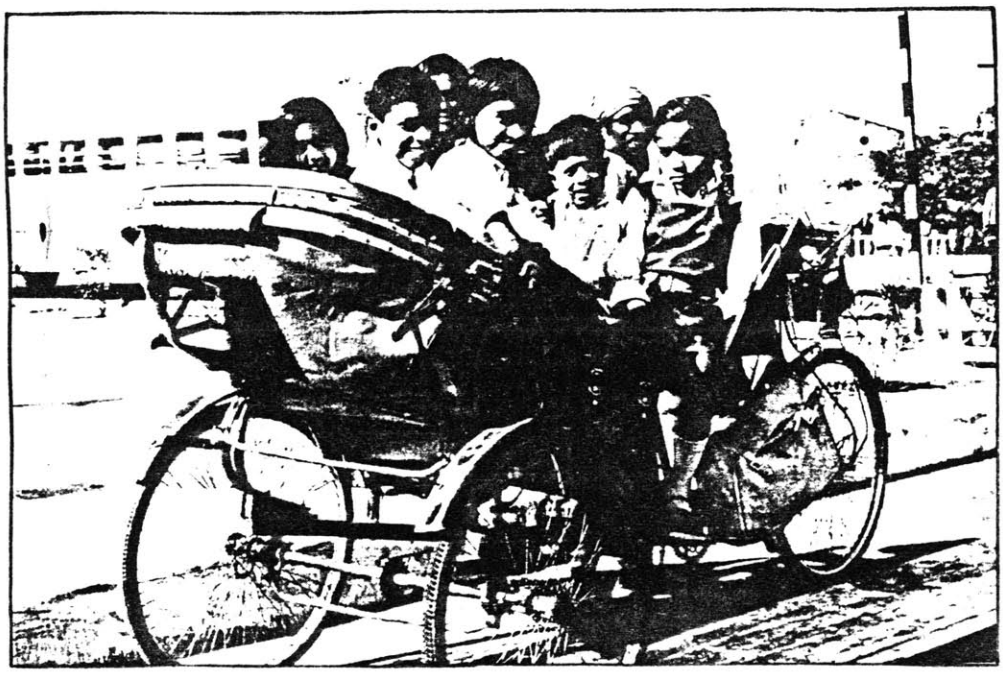


Figure 4-10: Children being transported to school on cycle-rickshaw

4.3 Comparative User Charges and Service Characteristics

Table 4-1 presents a comparison between different types of public transport services in terms of fare, seating capacity and the type of service provided.

The seating capacity varies from 2 to 3 persons for rickshaws, 6 to 9 for motor-cyclerickshaws and tempos, 12 to 24 for minibuses and 45 to 60 for standard buses. Cycle- and auto-rickshaws and taxis provide door to door service. Fare for cyclerickshaws is generally fixed by bargaining between the driver and the passenger on the basis of prevalent charges. The charges may vary according to the time of the day and weather conditions. Auto-rickshaw fares are generally metered, and fixed on distance gradation basis by the regulating authorities. But depending on demand, which may vary with destination and time of the day, auto-rickshaw drivers may illegally charge fixed fares independent of the metered fare.

Motor-cyclerickshaws (which operate in Delhi only), tongas, tempos and minibuses provide bus-like services. Stops are generally fixed during peak periods and flexible during off-peak periods. Sometimes, tongas provide door to door service also, in which case fare is fixed by bargaining for the services of the entire vehicle. Otherwise, these IPT modes charge a fixed fare for a fixed distance on per person basis. Generally, passengers have to pay extra if they wish to carry luggage.

Legally, taxis are permitted to provide door to door service; the vehicle is hired by one party only and pay the fare by meter reading. Increasingly though, in most cities, taxis operate a shared service (shared by strangers) during peak periods. Each passenger pays a fixed fare between origin and destination predetermined by the driver. These kinds of services generally originate from upper income residential neighborhoods to the central business district during morning peak hours and in the reverse direction during evening peak periods.

Mode/City	Fare per pass. Km.(paise)	Average lead (Km)	Occupancy per trip	Type of Service Sharing	Fare	Route
TAXI SERVICE						
Cyclerickshaw						
Faridabad	63	1.8	1.4	n	n	pd
Meerut	51	1.5	1.6	n	n	pd
Agra	45	2.8	1.9	n	n	pd
Jaipur	32	1.5	1.9	y	n	pd
Kanpur	52	1.7	1.6	n	n	pd
Hyderabad	16	2.3	2.4	y	n	pd
Delhi	67	1.0	1.5	y	n	pd
Autorickshaw						
Baroda	35	2.5	2.1	n	m	pd
Jaipur	52	3.9	1.8	n	m	pd
Bangalore	53	4.2	1.5	n	m	pd
Hyderabad	33	3.6	2.6	y	m	pd
Delhi	53	6.6	1.5	n	m	pd
Auto-taxi						
Delhi	50	10.4	2.5	y	m	pd
BUS SERVICES						
Tongas						
Meerut	12	2.5	6.0	y	f	f
Agra	16	3.2	5.0	y	f	f
Jaipur	17	2.8	5.0	y	f	f
Delhi	14	4.5	6.0	y	f	f
Minibus						
Jaipur	10	4.1	15	y	f	f
Kanpur	14	8.0	7	y	f	f
Hyderabad	10	9.1	21	y	f	f
Calcutta	13	7.2	28	y	f	f
Standard Bus						
Agra	4	4.3	44	y	f	f
Jaipur	6	6.0	50	y	f	f
Bangalore	5	7.5	47	y	f	f
Pune	6	5.6	37	y	f	f
Hyderabad	5	7.3	64	y	f	f
Delhi	4	9.9	52	y	f	f

Source: Fouracre, P.R. *et.al., Public transport Supply in Indian Cities* [16].
Key: Sharing: n = no, y = yes Fare: n = negotiated, f = fixed
Route: pd = passenger determined, f = fixed

Table 4-1: Public transport user charges and service characteristics in selected cities, 1977

Government owned standard buses provide service on prescribed routes with fixed stops during fixed hours. The fare is fixed by the regulating body and charged on per passenger basis. Monthly *passes* are available at charges less than the regular fare, and students are offered additional discount passes.

Table 4-1 shows the fare paid per passenger kilometer on different public transport services. The data has been taken from selected cities in India. As expected, user charges are the highest for taxi-like services. Fare per passenger kilometer varies from 16 paise (cyclerickshaws in Hyderabad) to 67 paise (cyclerickshaws in Delhi). Fare per passenger kilometer for bus like services varies from 4 paise (standard bus in Delhi) to 17 paise (tongas in Jaipur).

The table suggests that sharing of services on a vehicle generally results in lower fares especially for IPT modes that offer taxi-like services, for example, cyclerickshaws and autorickshaws in Hyderabad. However, the data in the table does not provide any information on whether competition between modes leads to lower fares.

Chapter Five

Physical and Economic Structure Of the Cities

5.1 Hyderabad

Hyderabad is the capital city of the state of Andhra Pradesh in the southern part of India. According to the 1971 Census, the population of the urban agglomeration was about 1.8 millions with a relatively high growth rate of about 44 percent during the 1961-71 decade. Today, Hyderabad is the fifth largest metropolitan city in India.

The Hyderabad Metropolitan Region (MRH) also consists of the city of Secunderabad; the twin cities have close socio-economic ties. The city of Hyderabad is physically divided into north and south regions by the Musa river, giving rise to two distinctive central business districts. The old city core, south of the river, is the original center of trade and commerce, characterized by high density commercial and residential quarters. The hub of the administrative and government offices is to the north of the river, almost halfway to the city of Secunderabad. Most industries and educational institutions are located in this part of the city. The duality of north-south is even more stark in terms of spatial economic growth because most employment opportunities are being developed in the northern part of the city.

5.1.1 Employment structure in the city

As Hyderabad is the administrative seat of the government of Andhra Pradesh, the service sector employs the largest percentage of the city's work force. In 1971, about 33.3 percent of the total working force was employed in service related activities. Tertiary sector activities (includes service activities) on the whole, accounted for nearly 70.2 percent of the total work force; 23.1 percent in activities related to trade

and commerce, 13.8 percent in transport and communications and the remaining 33.3 percent in the services. In the secondary sector, 22.6 percent of the work force was employed in the manufacturing industries and 4.6 percent in the construction industry. Table 5-1 gives the percentage distribution of the work force in different sectors of the economy. The table shows the comparative figures in two regions: Municipal Corporation of Hyderabad (MCH) and the Metropolitan Region of Hyderabad (MRH) in 1961 and 1971.

SECTORS	MCH		MRH	
	1961	1971	1961	1971
Primary	2.3	2.6	18.2	15.1
Secondary				
Manufacturing	20.3	22.6	18.8	21.0
Construction	3.5	4.6	3.1	4.3
Tertiary				
Trade and Commerce	19.1	23.1	14.2	18.2
Transport and Com.	10.3	13.8	7.9	11.3
Services	44.8	33.3	37.9	30.2

Source: *Optimal Metropolitan Development of Hyderabad*, Indian Institute of Economics, Hyderabad [23].

Table 5-1: Percentage distribution of work-force in different economic sectors in Hyderabad

5.1.2 Work participation rate

Although the total number of workers employed is growing in absolute numbers in Hyderabad, the population is growing at a still faster rate; consequently, the work participation rate has been declining since 1921.

	1921	1931	1941	1951	1961	1971
Participation Rate(%)	45.8	41.0	41.0	31.8	34.0	27.7

Source: *Optimal Metropolitan Development of Hyderabad Region*, Indian Institute of Economics, Hyderabad [23].

Table 5-2: Work participation rate in Hyderabad

According to Table 5-2, in 1971, the workers' participation rate was only 27.7 percent as against 34 percent in 1961 and 31.8 percent in 1951. These figures indicate the large number of work force that is unemployed. In addition to the problems of unemployment, a large proportion of the employed work force are engaged in the informal sector; the informal sector is generally identified as units of operation other than the registered units or establishments.

Table 5-3 gives an estimate of the sectorwise percentage distribution of employment in the informal sector in the Hyderabad Metropolitan Region.

According to this table, an estimated 47 percent of the Hyderabad economy (in terms of employment) falls within the informal sector. Employment in the informal sector is the highest in the trade sector (68%), followed closely by the transport sector

Sectors	Percentage Employed in the Informal Sector to the Total Employed in Each Sector
Manufacturing	38.9 %
Construction	52.0 %
Trade & Commerce	68.3 %
Transport & Communications	62.5 %
Services	52.6 %
All Sectors (excluding Primary)	46.9 %

Source: *Optimal Metropolitan Development of Hyderabad Region*, Indian Institute of Economics, Hyderabad [23].

Table 5-3: Sector-wise distribution of employment in the informal sector in Hyderabad

(62.5%). Services and construction sector reveal a medium level of intensity (52.6% and 52% respectively); manufacturing sector has the lowest level (38.9%) of informal employment. The preponderance of tertiary sector activities generally give rise to large demand for goods and services that can be easily satisfied by individualized or miniscule operations. But in terms of productivity and income levels, a large informal sector signifies a low level of functioning of the urban economy. This characteristic of the urban economy is very common among most cities in the developing countries, and Indian cities are no exception.

According to the 1971 Census in Hyderabad, there were about 23,000 trade establishments in the metropolitan region. The average per unit employment in these establishments was about 2.7. Retail establishments had an average employment of about 2.1 persons per unit, 4.7 persons per unit in the wholesale establishments and about 7.3 persons per unit in the restaurants and hotels. In the transport and communications sector, nearly 43,600 workers were engaged as 'informal' workers in 1971, represented primarily by the cycle-rickshaw and auto-rickshaw drivers and casual laborers.

5.2 Kanpur

5.2.1 Urban and physical structure of the city

Kanpur is a very old city, located in the northern part of India, approximately 435 kilometers from the national capital, New Delhi. Between the years 1773-1801, it served as army headquarters for the moghuls in India. After 1857 until India's independence in 1947, Kanpur was a major military establishment of the British in India.

Leather and cotton industries were established around 1860's in the city of Kanpur; it also marked the first influx of immigrants from the countryside.

Transport and communications network in the city grew with its importance as a regional military and industrial center. By 1832, road link was set up and work started on the Grand Trunk Road, the most important east-west highway in northern India. Railways came to Kanpur in 1859, telephone facilities in 1891 and electricity in 1906.

Although Kanpur is not the administrative capital of the state of Uttar Pradesh, it is

the industrial and commercial capital of the most populous state in India. Kanpur is also a very important transit center, both for passenger and goods, in the transport network of northern India.

Kanpur attained the status of a million-plus city during the decade of 1961-71. The population of the city of Kanpur was about 1.51 million in 1977. According to the 1971 Census, the city of Kanpur ranked eighth among India's million-plus cities but its position is fourth among the forty-nine manufacturing cities in the country.

The shape of the city of Kanpur is linear, spreading about 17 miles in the east-west direction and 7.5 miles in the north-south direction. Out of the total land area of 233 sq.kms. within the municipal boundary, only 60 sq.kms. is developed land. Of the developed land, 46.5 percent is under residential use. But there is great disparity in residential densities within the city. Although in major parts of the city, the residential density varies from about 4940 to 17,290 persons per sq.km., in central parts, the density may be as high as 19,760 persons per sq.km. Housing situation is also quite bad due to congestion and non-availability of houses. According to a 1960 survey, nearly 75 percent of the households lived in one room, 18.2 percent had two-room accommodation, and only 6.6 percent lived in houses with three or more rooms [34].

Commercial land accounted for only 2.7 percent of the total developed land in Kanpur and is primarily concentrated in the congested core of the city, often with double use, ie. residence cum commercial. Absence of godowns and warehouses further aggravates the overcrowded conditions in the marketplaces. Only 9.4 percent of the developed land accounts for industrial use. Textile and leather industries, which were established in the nineteenth century, now fall within the thickly populated residential areas. Figure 5-1 shows the land-use pattern in the city in 1971. Land under circulatory use, ie. roadways and railways, accounts for only 13 percent of

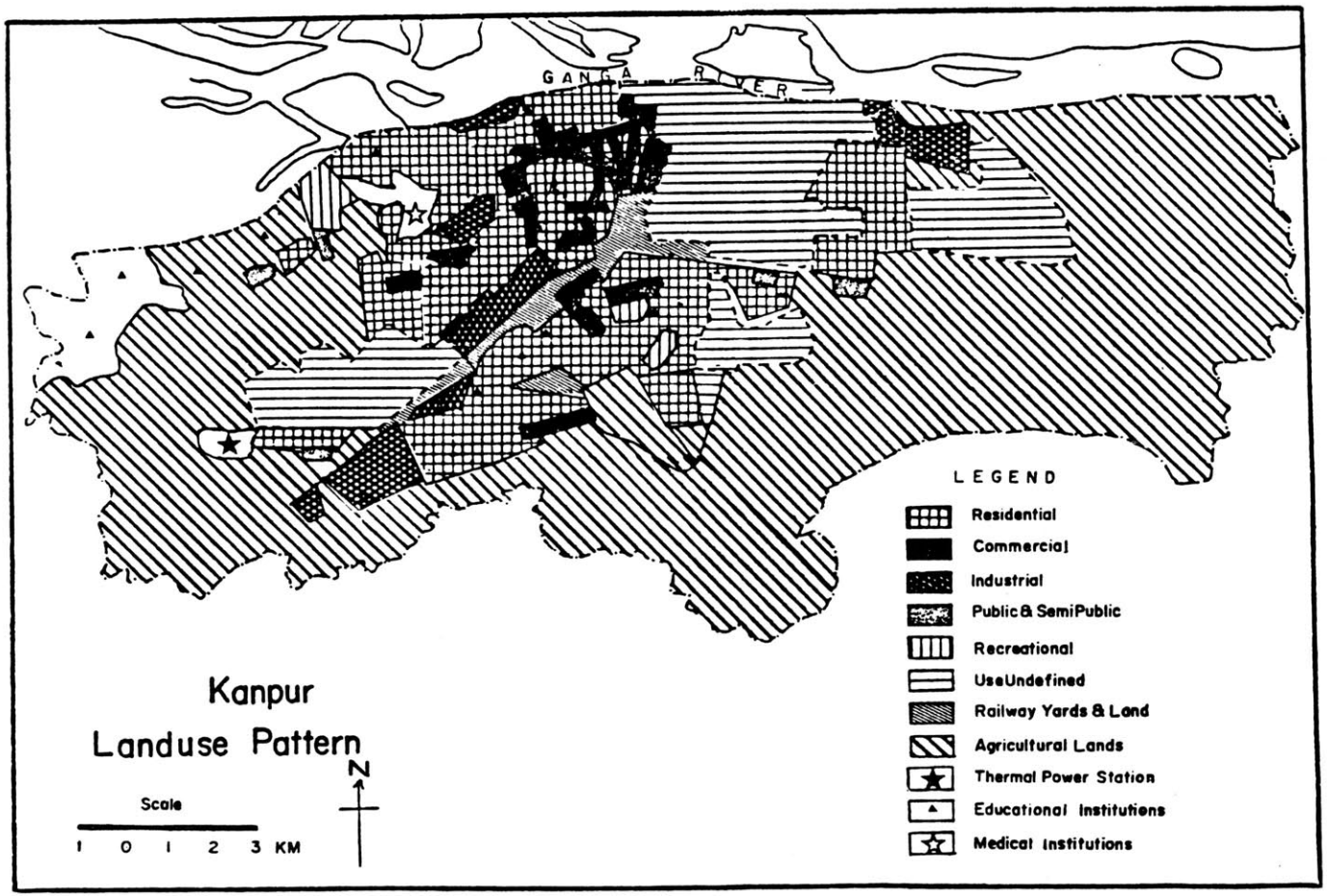


Figure 5-1: Land use pattern in Kanpur in 1971

the total developed land. But railways, which includes yards, railway stations and goods stands, account for more that fifty percent of the land under circulatory use. Only 3.5 sq.kms. of land is devoted for roads, which is a meager 4.4 percent of the total developed land in Kanpur.

5.2.2 Economic and occupational structure of the work force

Although the total number of workers has increased considerably with the growth in population, the work participation rate has declined steadily in the city since 1931. The participation rate has decreased from 40.5 percent in 1931 to 37.3 percent in 1951, 32.6 percent in 1961 and 30.4 percent in 1971 [34].

The occupational structure of the work force has also undergone change during the past decades. According to Table 5-4, in 1951, the share of the secondary sector was nearly 47 percent of the total work force; it has since declined to 35.6 percent in 1971. On the other hand, the share of the tertiary sector has risen during the two decades (1951-71). In 1951, about 51.8 percent of the total work force was employed in the tertiary sector; this figure rose to 55.8 percent in 1961 and to 60.2 percent in 1971.

In the tertiary sector, transport related activities showed a small increase from 7.3 percent in 1951 to 8.6 percent in 1971. Similarly, trading and commercial activities experienced a slight increase from 19.8 percent in 1951 to 20.6 percent in 1971. But the most significant rise was in the miscellaneous service activities; it increased from 24.7 percent in 1951 to 31.0 percent in 1971. This trend shows that the increased population in the city found more employment in the area of administrative and miscellaneous services than in industry or trade. Another interesting aspect of the occupational structure in the city of Kanpur is that nearly 40 percent of the total work force is employed in the informal sector of the economy [57].

Sectors	1951	1961	1971
Primary	1.3	4.0	4.2
Secondary	46.9	40.2	35.6
Tertiary	51.8	55.8	60.2
Trade & Commerce	19.8	18.0	20.6
Transport	7.3	8.0	8.6
Other services	24.7	29.8	31.0

Source: Misra, R.P. (editor), *Million Cities of India* [34].

Table 5-4: Employment structure of the work-force in different economic sectors in Kanpur

5.3 Pune

5.3.1 Urban and physical structure of the city

The city of Pune had a population of about 0.86 million in 1971 and in the metropolitan region it was about 1.15 millions. By 1977, the city's population had increased to about 1.08 millions. Although Pune, as an urban center, dates back to late eighteenth century, it developed as a major military establishment in mid-nineteenth century under the British rule. Today, in addition to being one of the major military base in India, Pune has gained prominence as an industrial center, primarily influenced by its proximity to the city of Bombay. As more and more industries developed on the outer fringe of the city, Pune Metropolitan Area expanded to include newly emerging industrial townships of Pimpri, Chinchwad and Bhosari along the Bombay-Pune road and rail links. See Figure 5-2.

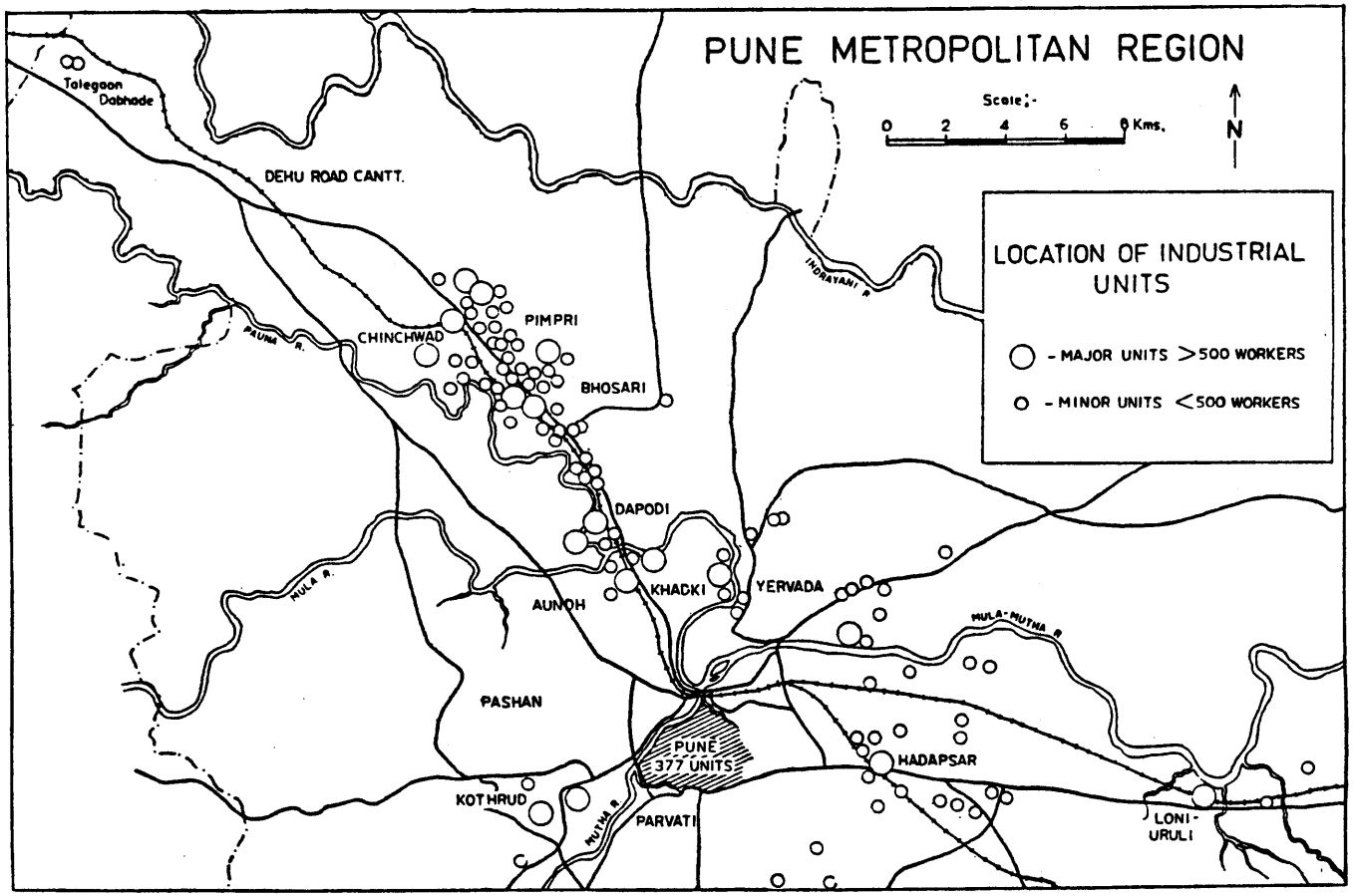


Figure 5-2: Map of Pune Metropolitan Region

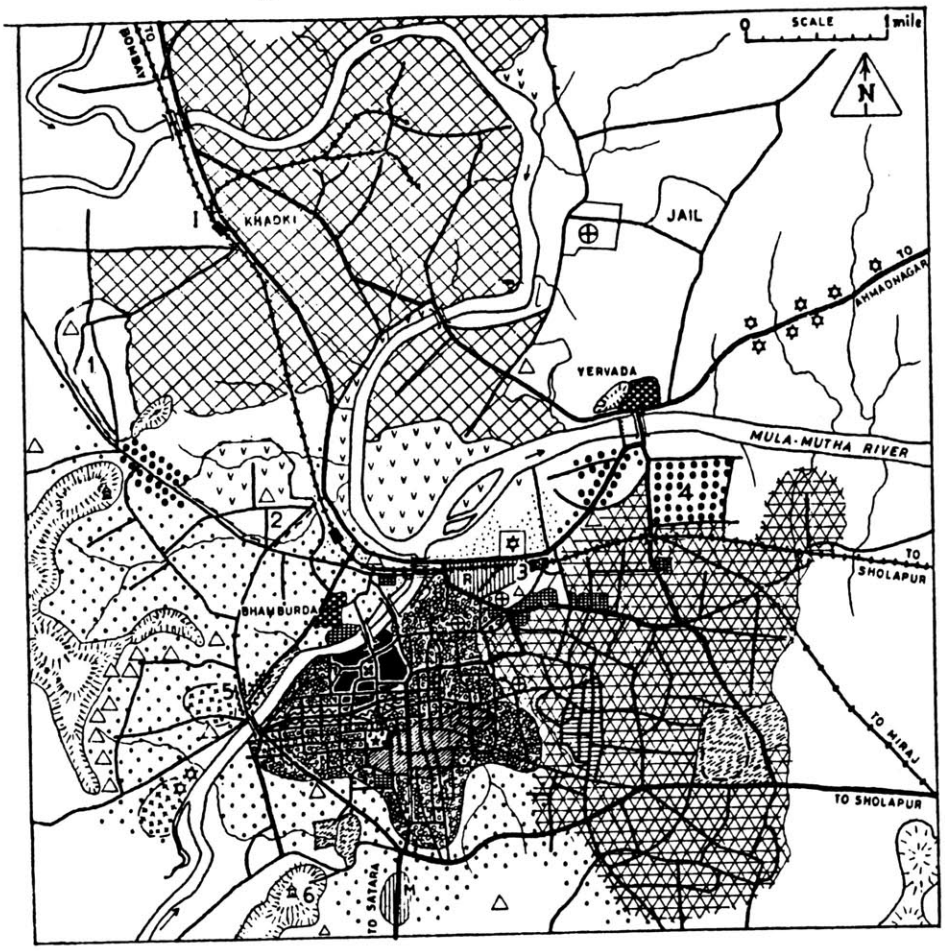
Although the old city core of Pune is densely populated and has more intense activity centers as compared to its outer fringe, the city core is relatively free of basic mobility problems unlike other large cities in India. A significant point in Pune's urban structure and morphology is the existence of vast open spaces mostly those of public institutions like colleges, university, military farms and cantonment areas.

Pune is perhaps one of the unusual cities in India where commuting starts from the central residential areas to the periphery; see Figure 5-3. Of the total industrial commuters, nearly 39.3 percent are pedestrians, 40.35 percent use bicycles, only 10.65 percent travel by bus and about 8.75 percent use the suburban railways. The cyclists and pedestrian commuters swirling out of the city in the mornings and returning home in the evenings are a familiar sight in Pune. The cyclist and pedestrian commuter is an important factor in the city's traffic pattern. Most of the industrial complexes draw a large percentage of skilled workers from the core of the city. For example, Chinchwad gets only 40 percent of its required labor from its hinterland and Pimpri gets only 37 percent [34].

Although Pune has its own share of urban poor, compared to other cities, its economic base is much more sound; only 13 percent of its population was reported to be living in slums in 1971. This number has grown over the past decade, but it is far less compared to other large cities. The percentage of population living in slums in Pimpri-Chinchwad area is about 26 percent, probably industrial development in that area has attracted migrants from rural areas to live in close proximity to employment opportunities.

Out of the total workers of about 54,000 employed in the manufacturing industry in Pune, about 31 percent work in 377 factories in the city. The Pimpri-Chinchwad industrial complex employs about 24 percent of the industrial labor force in about 70 factory units, emphasizing the large scale and sophisticated technology employed for manufacturing in these units.

Figure 5-3: Land use pattern in Pune



Key

A — Old core with the fort
B — New City Centre—Strip shopping areas
C — Old City
D — Pune Cantonment
E — Defence
F — Wholesale markets
G — Transport Zone—Railway, Motor transp.
H — Old Suburb
I — New Suburban Growth
J — Agricultural patches
K — Urban Village
L — Administrative Zone
M — Sadar Bazar
N — Open spaces, parks
O — Hilly areas
P — Educational Institutions
Q — Hospitals
R — Central Vegetable Market
S — Industrial units
T — Residential area—Rich class, Middle class, Poor class
1 — Pune University—Ganeshkhind
2 — Agricultural College
3 — Pune Railway Station
4 — Koregaon Park
5 — Deccan Gymkhana
6 — Parvati

No detail data is available regarding the occupational structure of the working force in Pune.

5.4 Meerut

5.4.1 Urban and physical structure of the city

The city of Meerut dates back to over 200 years, but the main impetus to its growth was the setting up of the military cantonment in early eighteenth century.

Meerut is a major trade center in northern India and benefits from its proximity to the national capital, which is only 66 kms. away. The city developed primarily under the British rule and has distinct cantonment and civil lines to the north and west; the main residential areas of the then native population developed south of the cantonment, east of the Delhi-Muzaffarnagar railway lines. The system of road network is not well planned or developed in the old quarters of the city. However, Meerut is very well connected to its hinterland and other big cities in northern India. The accompanying Figure 5-4 shows some of the major highways passing through the city and the location of railway station, university, medical college cantonment and civil lines etc.

The city of Meerut spreads over an area of nearly 50 sq.kms. In 1961, the population of the city was about 0.28 million which increased to 0.37 million in 1971, the decadal growth rate was about 30 percent. By 1977, the population had increased to 0.43 million.

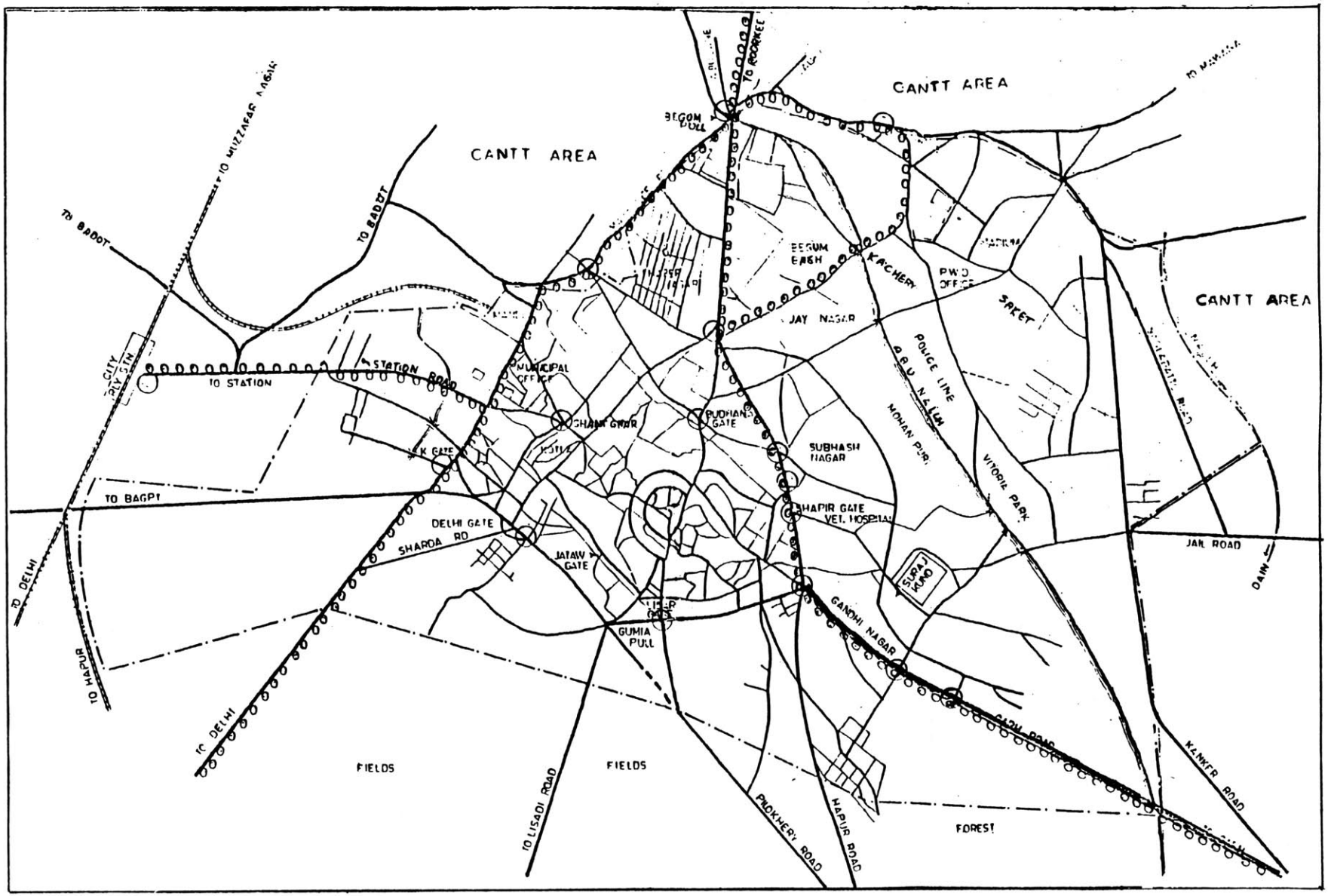


Figure 5-4:Map of Meerut showing activity centers and road network

5.4.2 Occupational structure of the work force

The city first experienced ribbon development along the regional and national roads, and then grew concentrically around these roads. Although Meerut is classified functionally as a manufacturing city, almost 70 percent of its total workers are in the non-established sector of the economy. The labor force is approximately 52.8 percent of the total population, but the work participation rate is only 27.8 percent [57]. One of the common feature of overwhelming informal sector in an urban economy is the preponderance of petty trading and commercial activities that are carried out on the main arterial roads and by lanes of the city giving rise to congestion. Meerut is no exception to this phenomena. Also, about 90 thousand people, ie. approximately 18 percent of the total population earn their living from the informal transport sector alone.

5.5 Aurangabad

5.5.1 Urban and physical structure of the city

The population of the city of Aurangabad as per 1971 Census was about 0.16 million, experiencing a 69.1 percent rate of growth during the decade of 1961-71. Aurangabad's population grew at a rate of 5 percent annually during 1961-71, which is quite high by average standard. Migration rate was to the extent of 2.5 percent annually, and the growth of industrial worker was about 3 percent during 1963-73 period [60].

Similar to other cities in India, the old city of Aurangabad also suffers from over congestion and high density development. Most of the commercial activities are concentrated within the fort walls of the city which has created hazardous traffic situation in that part of the city.

Figure 5-5 presents the major road network and location of traffic generating activities and population densities in different parts of the city respectively. New industrial developments are located well outside the city boundary, which calls for long commuting from the city core area. Most of the medical, marketing and educational facilities are located close to the core area, and the inter-city bus station is even closer.

Aurangabad is also a major tourist center as it is located close to the famous Ajanta and Ellora Caves. The city, therefore, experiences some tourist traffic also.

The new residential colonies have come up on the outer fringe of the old city as depicted in Figure 5-5. Figure 5-5 also shows the major industrial development to the right, far removed from the city core.

No data is available regarding the occupational structure of the work force in the city of Aurangabad except that work participation rate was only 25.6 percent of the total population in 1977 [57].

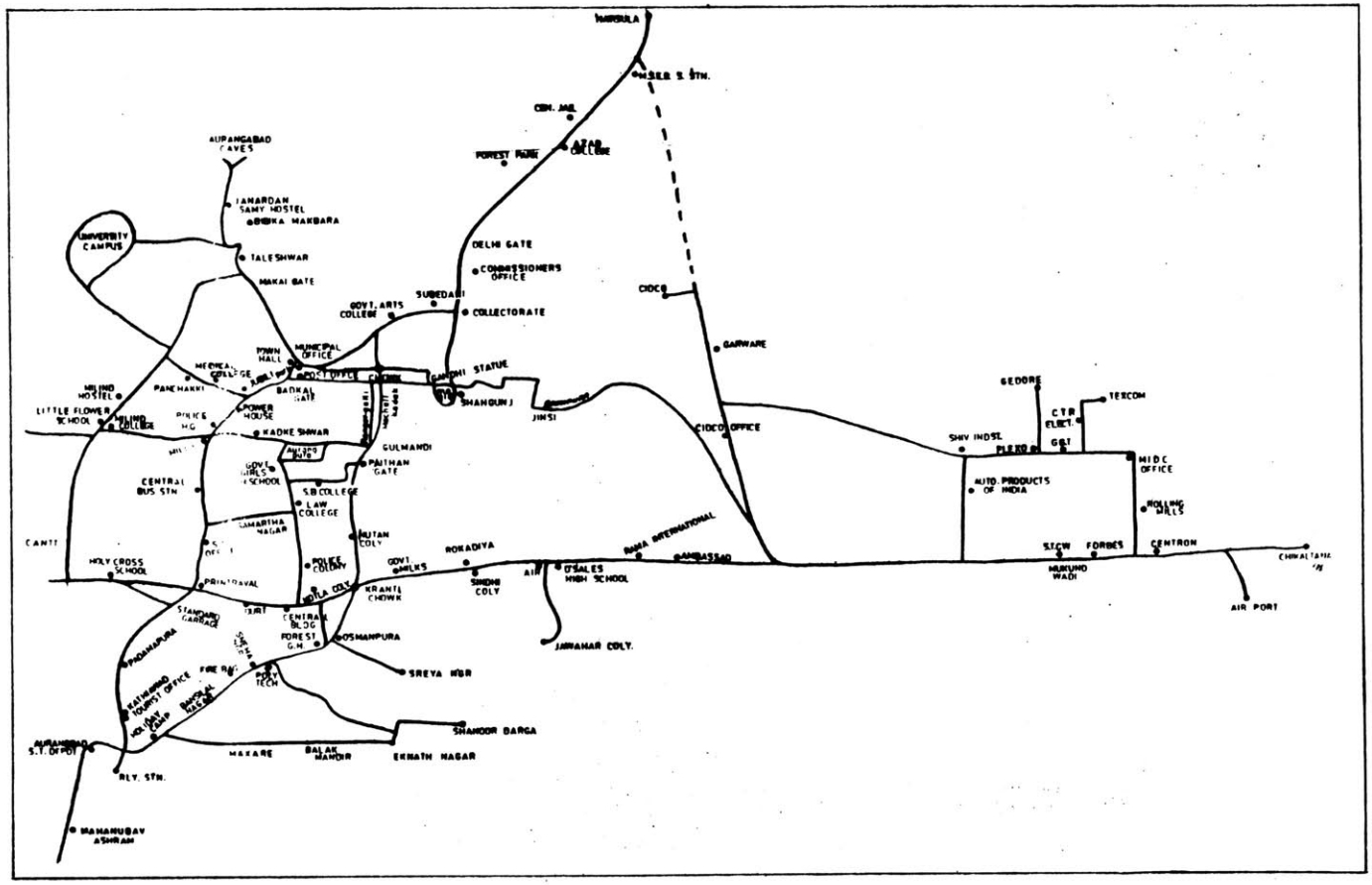


Figure 5-5: Map of Aurangabad showing different activity centers

5.6 Faridabad Complex

5.6.1 Urban and physical structure of the city

The Faridabad Complex consists of two towns, Faridabad and Ballabhgarh. The Faridabad/Ballabhgarh township serves as a satellite industrial township for the national capital, New Delhi. Situated only 27 kms. from New Delhi, this township is a classic example of linear development along the major Delhi-Mathura National Highway and railway line, see Figure 5-6. The total area of the Complex is only 26 sq.kms. and it extends linearly for 20 kms. along the highway. The population of the Faridabad/Ballabhgarh complex was only about 59,000 in 1961, and it increased by 108 percent within a decade to 123,000 in 1971.

5.6.2 Occupational structure of the work force

The work participation rate in Faridabad Complex was about 33 percent only, although the total labor force is nearly 57.6 percent of the total population. According to the 1971 Census, of the 40,620 workers, only 22,585 or 55.6 percent worked in the established sector of the economy. The rest 44.4 percent were part of the informal sector activities. Also, about 38 thousand people, approximately 19 percent of the population, owed their livelihood to the informal transport sector alone, working as drivers, operators and workers in the service and the ancillary industry [57].

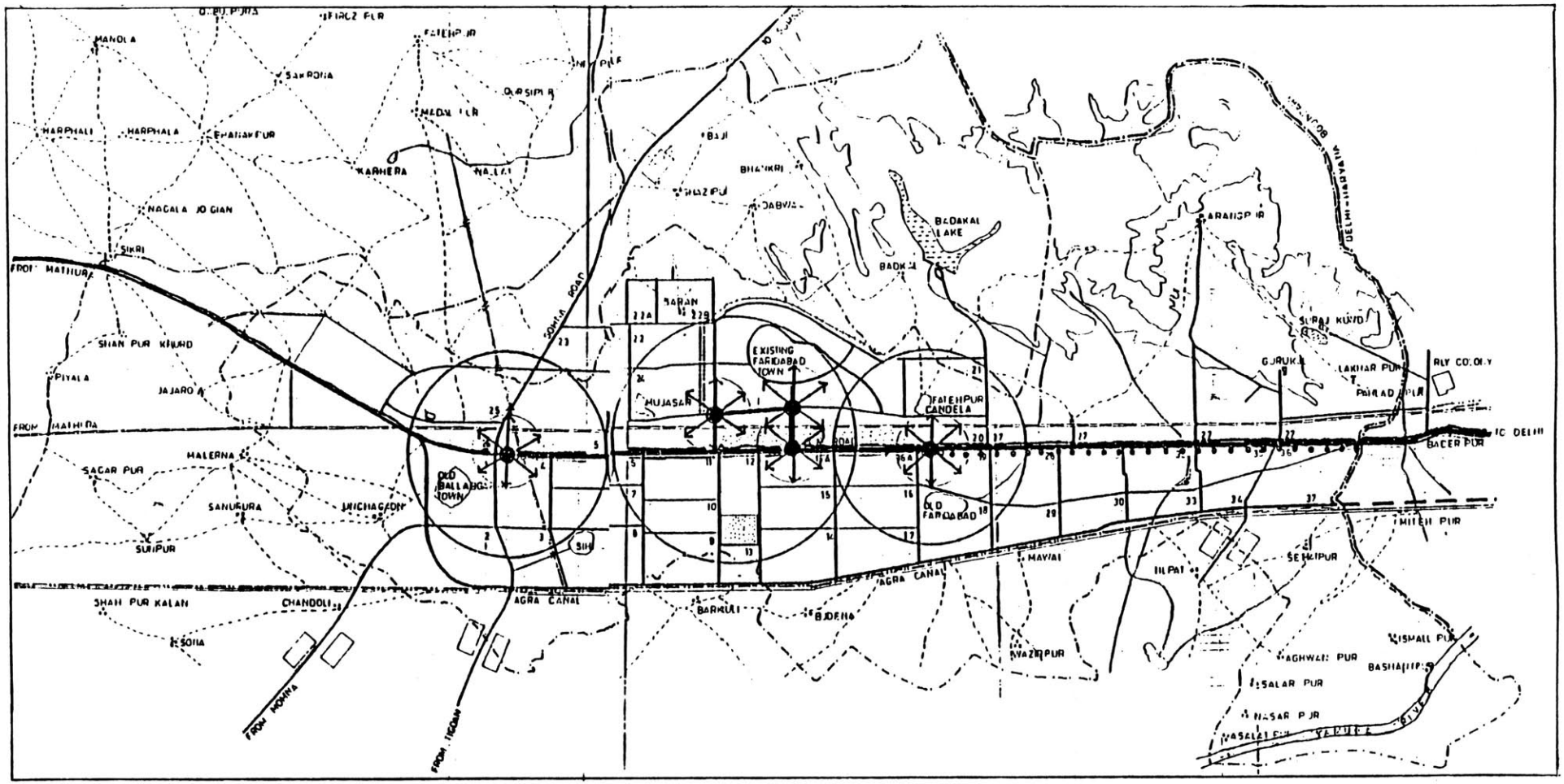


Figure 5-6: Map of Faridabad showing its linear structure

Chapter Six

Transport Facilities in the Selected Cities

6.1 Transport Facilities in Hyderabad

The traffic in the city of Hyderabad is heterogeneous in nature. Almost all roads in the city carry a mix of slow-moving vehicles like man and animal driven carts, bicycles and cycle-rickshaws, and fast moving vehicles like scooter and motorcycles, auto-rickshaws, cars and buses.

6.1.1 Growth in passenger transport vehicles in Hyderabad

Over the years, both slow and fast moving vehicles have increased considerably. Table 6-1 and Table 6-2 show the absolute increase in the number of fast and slow moving vehicles respectively, and the availability of these vehicles per 1000 persons between the period 1970-71 and 1976-77.

According to these tables, bicycles and motor-cycle/scooters are the most widely used form of private transport in Hyderabad. The number of bicycles increased from 303,000 in 1970-71 to 800,000 in 1976-77. Considering an average of five persons per household, there were 1.76 bicycles per household in 1977 in Hyderabad. Motor-cycles/scooters are a popular mode of private transport for the higher and middle income families. The number of motor-cycles/scooters doubled over a period of six years, from 18,443 in 1970-71 to 36,245 in 1976-77. Ownership of motor-cycles/scooters increased from 11 per 1000 persons in 1970-71 to 16 per 1000 persons in 1976-77, a growth rate of 21 percent per annum during this period. Although Hyderabad is the fifth largest metropolitan city in India, car ownership levels are still very low. There were only 13,261 cars among a population of 2.27 millions in 1977, i.e., 5.8 cars only per 1000 persons, with the growth rate of 6.6 percent per annum.

	1970-71	1976-77
Auto-rickshaws		
Total Number	1969 (b)	5812 (a)
Per 1000 persons	1.22 (c)	2.6 (a)
Growth rate per annum(1971-76)		15.3%
Cars		
Total Number	na	13261 (a)
Per 1000 persons	na	5.8 (a)
Growth rate per annum(1971-76)		6.6%
Motor-cycles/Scooters		
Total Number	18443 (b)	36245 (a)
Per 1000 persons	11.44 (c)	16.0 (a)
Growth rate per annum(1971-76)		21.0%
Buses		
Total Number	379 (b)	584 (a)
Per 1000 persons	0.24 (c)	0.26 (a)
Growth rate per annum(1971-76)		4.64%

Source: (a) Fouracre, P. R. *et. al.*, *Public Transport Supply in Indian Cities* [16].
(b) *Optimal Metropolitan Development of Hyderabad*, Indian Institute of Economics, Hyderabad [23].
(c) Computed from (a) and (b).

Table 6-1: Growth of fast-moving passenger transport vehicles in Hyderabad, 1970-76

	1970-71	1976-77
Bicycles		
Total Number	303,000 (a)	800,000 (b)
Per 1000 persons	187.9 (c)	352.4 (c)
Cycle-rickshaws		
Total Number	12,699 (a)	14,000 (d)
Per 1000 persons	7.87 (c)	6.2 (c)

Source: (a) *Optimal Metropolitan Development of Hyderabad*, Indian Institute of Economics, Hyderabad [23].
(b) Rajas Parchure, *Problems of Transport in Pune Metropolitan Region*, National Seminar on Metropolitan Transport in India [47].
(c) Computed from other sources.
(d) *Objective Assessment of the Role of Intermediate Public Transport in Cities of Different sizes*, School of Architecture and Planning, New Delhi [57].

Table 6-2: Growth of slow-moving passenger transport vehicles in Hyderabad, 1970-76

As far as public transport modes (the one's that are available for hire) are concerned, autorickshaws experienced the largest annual growth rate (15.3%) during the period 1971-76 as compared to standard buses (4.64%) and cyclerickshaws. In the city of Hyderabad, there were 14,000 cyclerickshaws, 5812 autorickshaws and 584 buses in 1976-77.

6.1.2 Percentage of passenger trips by different modes

Table 6-3 indicates the importance of intermediate transport modes in Hyderabad. Due to the large carrying capacity of standard buses (about 60 to 70 persons in buses as compared to only 2 or 3 for cycle- and auto-rickshaws) about 43 percent of all passengers carried on public transport was accounted by the bus services. The

percentage share of passengers carried by auto- and cycle-rickshaws together was also very large at 57 percent. Of this, 36 percent was carried by cycle-rickshaws and 21 percent by autorickshaws.

Public Transport Modes	No. of passengers carried daily	Percentage per mode
Cycle-rickshaw	470,000	36%
Auto-rickshaw	272,000	21%
Bus	558,035	43%

Source: (a) *Objective Assessment of the Role of Intermediate Public Transport in Cities in India,* School of Architecture and Planning, New Delhi [57].
(b) Fouracre, P. R. *et. al. Public Transport Supply in Indian Cities* [16].

Table 6-3: Passenger modal-split by different public transport services in Hyderabad, 1977

6.1.3 Socio-economic characteristics of passengers using different modes of public transport

Table 6-4 gives an estimate of the use of different modes of public transport according to the income level of the passengers. The income levels have been categorized as low (less then Rs. 500 per month), middle(between Rs. 501-1000 per month) and high(above Rs. 1001 per month).

The average monthly income is the highest among the users of auto-rickshaw (Rs. 710) followed by minibus travelers (Rs. 590), bus travelers (Rs. 550) and the least is that of the cycle-rickshaw users (Rs. 520).

Transport Mode	Monthly Income <Rs.500	Rs.501-1000	>Rs.1000	Average Income
Cycle-rickshaw	53%	37%	10%	Rs.520
Auto-rickshaw	23%	61%	16%	Rs.710
Minibus	40%	53%	7%	Rs.590
Bus	54%	33%	13%	Rs.550

Source: Maunder, D. A. C. *et. al.*, *Characteristic of Public Transport Demand in Indian Cities* [28].

Table 6-4: Percentage use of different public transport by monthly income in Hyderabad, 1977

More than half of the users of cycle-rickshaw come from the low income group, and only 10 percent belong to the higher income group. On the other hand, the use of auto-rickshaw is dominated by the middle income group at 61 percent of the total users of this mode. Buses are primarily used by passengers form the low and middle income group (54 and 33 percent respectively). Only 13 percent of the passengers come from the high income group. Fare per passenger kilometer for standard buses and minibuses was 5 paise and 10 paise respectively. Considering that the average fare of minibuses (per passenger kilometer) is twice that of standard buses, it is surprising that a significant number (40%) of minibus users come from the low income group and a very small number (7%) come from the high income group. As expected, the average income of minibus riders (Rs. 590) is higher than the bus riders (Rs. 550).

The following section gives the distribution of passengers on different modes by the purpose of their journey.

6.1.4 Purpose of journey by different public transport modes

According to Table 6-5, journey to work is most significant among all three modes of public transport, especially among bus travelers.

Purpose of Journey	Cycle-rickshaw	Autorickshaw	Bus
Work	36%	46%	65%
Education	3%	8%	15%
Social & Leisure	28%	21%	5%
Other	33%	25%	15%

Source: Maunder, D. A. C. *et. al., Characteristics of Public Transport Demand in Indian Cities* [28]

Table 6-5: Journey purpose of passengers by different public transport modes in Hyderabad, 1977

Although a little over one-third of the cycle-rickshaw travelers use this mode to go to work, a significant percentage also use it to go for shopping, recreation and health related journeys. Auto-rickshaw travelers use it also for similar purposes except a higher percentage (46%) of them use it for work related journeys. Although it is not clear form the data given above, it is suspected that a large percentage of work trips by cycle- and auto-rickshaws also include business trips. As stated earlier, travel to work is most significant (65%) among bus travelers. Education related journeys (15%) are also important perhaps due to the fact that students receive concessions from the state or municipally run bus companies.

6.2 Transport Facilities in Kanpur

6.2.1 Availability of major passenger transport vehicles in Kanpur

Kanpur is the largest city in northern India, after New Delhi, with a population of 1.51 millions in 1977. But for no apparent reasons, the city's passenger transport system is extremely deficient.

Table 6-6 shows the data on number of passenger transport vehicles, and Table 6-7 shows the percentage passenger trips by different transport modes.

Cycle-rickshaws, numbering over 35,000, dominate the passenger transport system in Kanpur. Inspite of large number of cycle-rickshaws operating in the city, their share of the total passenger trips on all transport modes is extremely low at 4.3 percent (see Table 6-7). In addition, there were about 162 standard buses in the city in 1984 [65], on an average only 96 buses operated daily. The bus services are operated by the Utter Pradesh State Road Transport Corporation (UPSRTC). The UPSRTC is primarily responsible for operating inter-city bus services in the state of Utter Pradesh, but it also provides urban services in a couple of cities in the state, including Kanpur. Due to heavy losses incurred by the urban bus services and higher profitability on rural routes, the bus services in Kanpur are badly neglected. The UPSRTC bus services in Kanpur are grossly underutilized; they carried only 510 passengers per bus per day as compared to 1394 passengers in Pune (1982-82) and 1165 passengers in Hyderabad (1977).

In addition to cycle-rickshaws, the majority of long distance and suburban passenger transport demand is met by *tempos*. Tempos have a seating capacity of about 9 persons per vehicle. In terms of total number of passengers carried, tempos in Kanpur carry substantially more number of passengers than standard buses, although the tempo fare is more than that of buses. More than 16 percent of all passenger trips

Type of Vehicles	No. of Vehicles 1981	No. of Vehicles per 1000 persons 1983-84
Bicycles	200,000	162.1
Cycle-rickshaws	35,000	33.1
Scooters/Motorcycles	9,157	7.4
Tempos	500	0.43
Car/Jeep/Vans	484	-
Buses	140	0.03
Tongas	-	1.58

Source: (a) *Issues concerning Kanpur's overall Transport System*, Traffic Engineering and Management Cell, Kanpur [64].
(b) *Traffic and Transport Report on Kanpur City*, Traffic Engineering and Management Cell, Kanpur [63].

Table 6-6: Number of passenger transport vehicles in Kanpur, 1981

Type of Transport Mode	Passenger Trips (%)
Bicycle	33.72
Scooter/Motorcycle	27.13
Tempo	16.31
Car/Jeep	9.73
Bus	7.66
Cycle-rickshaw	4.27
Van/Minibus	1.24
Auto-rickshaw	0.04

Source: *Kanpur Transport Statistics*, Traffic Engineering and Management Cell, Kanpur [65].

Table 6-7: Percentage of passenger trips by different modes in Kanpur, 1983-84

(including all modes of transport) in Kanpur are by tempos. In comparison, trips by standard buses account for 7.6 percent only of all passenger trips.

Among private modes of transportation, bicycle and scooter/motor-cycles are most popular in low income and middle/high income families respectively. More than 200,000 bicycles in Kanpur accounted for over one-third of all passenger trips by all modes. There were about 9,157 scooters/motorcycles, which accounted for 27 percent of all passenger trips. No separate data was available for privately owned cars/jeeps etc., but together they accounted for nearly 10 percent of all passenger trips.

In 1976, privately owned and operated minibus services were introduced in Kanpur, and they reached a total of 23 by 1978. According to a 1983 report [65], they have since disappeared, apparently because of low fares permitted by the regulatory body. A small number of taxis and auto-rickshaws also operate in the city, but their contribution to the overall passenger transport system is insignificant.

Although no data is available regarding vehicular density of each of the above mentioned transport modes on the roads of Kanpur city, it can generally be concluded that the density of bicycles, cycle-rickshaws and scooters/motorcycles will be very high, given their large numbers and low capacity.

Data regarding modal preference by income level and occupation is not available.

6.3 Transport Facilities in Pune

6.3.1 Growth in passenger transport vehicles

As a consequence of rapid industrial growth in the Pune Metropolitan Region, the demand for transport for both passenger and goods has grown very rapidly. The actual rate of growth in the number of vehicles was much greater than the predictions made in the Development Plan of Pune (1970-91). Table 6-8 shows the absolute growth in the number of different vehicles in the Pune Metropolitan region, and Table 6-9 shows the actual and forecasted percentage rate of growth of some of the vehicles.

In Pune, bicycles, scooters/motorcycles, cars and auto-rickshaw show the largest increase in vehicular growth. The number of scooters and motorcycles grew at an average annual rate of 74 percent as against predicted estimate of 22.6 percent. The staggering growth rate of auto-rickshaws at 153.44 percent per annum far surpassed the predicted rate of 24 percent. Bicycle ownership grew at a rate of 68.32 per annum, which was more than ten times the predicted growth rate. It is difficult to give precise reasons for this phenomenal growth in both personal and public transport vehicles. But it is possible that there was a rise in the production of autorickshaws. Also, cycle-rickshaws were abolished in Pune at around that period, and the government may have issued many more permits to auto-rickshaw operators to compensate for the loss of cycle-rickshaws. In 1980, the total number of two-wheelers (includes scooters, motorcycles and bicycles) in the Pune Metropolitan Region amounted to about 667,370, which is nearly 95 percent of all vehicles in the region. Bicycles alone accounted for about 85 percent of all registered vehicles in 1980.

Type of Vehicles	1967	1980
Scooter/Motorcycle	6816	67370
Car/Taxi/Jeep	4009	13791
Auto-rickshaw	1000	19413
Truck	3046	7931
Delivery van	*	2503
Tractor-trailer	369	1581
Bus	473	1827
Ambulance	14	127
Bicycle	65227	600000

Source: Rajas Parchure, *Problems of Transport in Pune Metropolitan Region*, National Seminar on Metropolitan Transport in India [47].

Note: (*) Subsumed under another category in 1967 survey.

Figures for Bus consists of both municipal buses run by the PMTC and contract buses. Of the 1827 buses in 1980, only 370 were run by PMTC.

Table 6-8: Growth in the number of transport vehicles in Pune

Type of Vehicle	Actual Growth (per annum)	Forecasted Growth (per annum)
Bicycle	68%	7%
Scooter/Motorcycle	74%	22%
Auto-rickshaw	153%	24%
Bus	24%	10%

Source: Rajas Parchure, *Problems of Transport in Pune Metropolitan Region*, National Seminar on Metropolitan Transport in India [47].

Table 6-9: Actual and forecasted growth rate of passenger vehicles in Pune, 1980

6.3.2 Percentage of trips by different passenger modes

Table 6-10 gives the purpose-wise modal split (percent) of daily trips among major passenger transport modes. The modal split of daily passenger trips in Pune is dominated by trips on foot, followed by bicycle, mass transport (including bus and suburban railway) and scooter/motorcycle trips.

Nearly half of all trips in Pune are accomplished on foot. Among work trips, walking and bicycles have almost equal split at slightly higher than 30 percent each. Walking is very significant for education related trips (65.92 percent) and also for shopping/recreation/social trips. The importance of bicycle as a means of passenger transport in Pune is second only to walking. Bicycles are primarily used for work trips (31.67 percent).

Mode	Work	Education	Others	Total
Walk	30.72	65.92	56.28	48
Bicycle	31.67	16.21	18.92	23
Mass Transport	13.62	12.25	7.46	11
Scooter/Mc	16.57	1.89	8.73	10
Car	3.56	0.81	3.26	2
Auto-rickshaw	2.77	2.66	5.07	3
Others	1.05	0.23	0.25	0

Source: Rajas Parchure, *Problems of Transport in Pune Metropolitan Region*, National Seminar on Metropolitan Transport in India [47].

Table 6-10: Percentage modal split of passenger transport by journey-purpose in Pune, 1980

Although mass transport figures in Table 6-10 consist of percentage of trips both by bus and suburban railway system, the latter provides for only 1.5 percent of the total transportation needs for journey to work. The remaining 12 percent of trips are provided by the bus system. Mass transport provides for only 11.46 percent of the total transport needs of the city, which is close to that provided by scooters and motorcycles (10.08 percent).

Scooter/motorcycle trips are quite significant as related to work trips. They account for 16.57 percent of total work trips.

In overall terms, auto-rickshaws provide for slightly more percentage of trips than cars (3.37 and 2.68 percent respectively).

Table 6-11 gives a comparison of modal split for work trips between the years 1965 and 1980.

Mode	1965	1980
Walk	39.30	30.70
Bicycle	40.35	31.67
Mass transport	19.40	13.60
Other private vehicles (*)	0.95	23.96

Source: Rajas Parchure, *Problems of Transport in Pune Metropolitan Region*, National Seminar on Metropolitan Transport in India [47].

Note: (*) primarily includes scooter/motorcycle

Table 6-11: Percentage change in modal-split for work trips in Pune, 1965-1980

The percentage share of mass transport for work trips has fallen from 19.4 to 13.6 percent. Although the proportion of people walking or using the bicycle to go to work has declined from the year 1965 to 1980, they still represent a large volume of people in absolute numbers. However, the gross substitution effect seems to be primarily in favor of scooters and motorcycles, which has risen from 0.95 percent in 1965 to 23.96 percent in 1980.

Data regarding modal preference by income-level for Pune is not available.

6.4 Transport Facilities in Meerut

Most of the core city area in Meerut are not accessible by large motorized transport vehicles. The intra-city bus transport system is almost negligible. According to a study conducted in 1977 by the School of Architecture and Planning, New Delhi [57], the city of Meerut had only 5 bus routes of which service was regular on two routes only. The two modes of public passenger transport providing for intra-city travel needs almost in entirety are the cycle-rickshaws and the horse driven tongas.

6.4.1 Growth in the number of passenger transport vehicles

Table 6-12 shows the growth of cycle-rickshaws and tongas in Meerut from 1973 to 1978. The number of cycle-rickshaws operating in the city increased from around 6993 in 1973 to about 8835 in 1978, a growth rate of about 26 percent during the period 1973-78. The number of cycle-rickshaws available per 1000 persons in 1977 was about 20.3, second only to Kanpur. The number of tongas increased at a rate of 36 percent during the same period. In 1977, there were about 1.35 tongas per 1000 persons in Meerut.

6.4.2 Socio-economic characteristics of passengers

Table 6-13 gives the monthly income distribution of users of cycle-rickshaws and tongas in Meerut. The average monthly income of users of cycle-rickshaws in 1977 was about Rs. 710 as compared to the tonga users which was slightly higher at Rs. 760 per month. Among the users of cycle-rickshaw, nearly 73 percent belong to the middle income households, 17 percent to low income and only 10 percent to high income households. Only 61 percent of tonga users belong to the middle income group and approximately equal number come from the low and high income group (19 and 20 percent respectively).

A look at Table 6-14 shows a direct relationship between personal vehicle ownership

Year	Cycle-rickshaw	Tonga
1973	6993	400
1974	7284	468
1975	7774	482
1976	8565	495
1977	8717	584
1978	8835	545
Growth Rate (%) (1973-78)	26%	36%

Source: *Report on Objective Assessment of the Role of Intermediate Transport in Cities of Different Sizes*, School of Architecture and Planning, New Delhi [57].

Table 6-12: Growth of public transport vehicles in Meerut, 1973-78

and the patronage of tonga by higher income groups. Although 45.8 percent of the cycle-rickshaw users do not own any vehicles, the corresponding figure for tonga users is only 23.6 percent. A much higher percentage of tonga users own bicycles (56.2%) and scooter/motorcycles (20.2%) as compared to cycle-rickshaw users (38.4% and 15.6% respectively). Car ownership levels are extremely low as expected.

Mode	Monthly Income		
	<Rs.500	Rs.501-1000	>Rs.1000
Cycle-rickshaw	17%	73%	10%
Tonga	19%	61%	20%

Source: Maunder, D. A. C. *et. al.*, *Characteristics of Public Transport Demand in Indian Cities*, [28].

Table 6-13: Distribution of public transport use by monthly income in Meerut, 1977

Public Transport users	Vehicle Ownership			
	Bicycle	Scooter/ Motor-cycle	Car	No Vehicle
Cycle-rickshaw	38.4%	15.6%	0.0%	45.8%
Tonga	56.2%	20.2%	n.a.	23.6%

Source: Maunder, D. A. C. *et. al.*, *Characteristics of Public Transport Demand in Indian Cities*, [28].

Table 6-14: Pattern of personal vehicle ownership among public transport users in Meerut, 1977

6.4.3 Purpose of journey by different modes

A break up of purpose of journey (percentage) by cycle-rickshaw and tonga is given in Table 6-15.

Purpose of Journey	Use of Public Transport Modes (%)	
	Cycle-rickshaw	Tonga
Work	36.45	57.45
Business	10.71	2.13
Health & Education	30.21	17.02
Shopping	8.21	6.38
Recreation	4.64	1.06
Change of Mode	9.07	15.96

Source: *Report on Objective Assessment of the Role of Intermediate Transport in Cities of Different Sizes*, School of Architecture and Planning, New Delhi [57].

Table 6-15: Purpose-wise modal split of passenger transport use in Meerut, 1977

Users of both cycle-rickshaw and tonga use these modes primarily for work trips (36.45 and 57.45 percent respectively). A significant number, about 30.92 percent, use cycle-rickshaws for health and education related trips, although the component of education trips is expected to be very small. Correspondingly, only about 17.02 percent only use tonga for similar purposes.

The cycle-rickshaw and tongas are used extensively by people to transfer to or from other faster transport modes, e.g. the inter-city buses and railways. This is evidenced by the significantly large percentage of tonga users (15.96 percent). Correspondingly, about 9.07 percent of cycle-rickshaw users travel by this mode for similar purpose.

Cycle-rickshaw is also used for business trips by about 10.71 percent of its users. Approximately, 10.85 percent of cycle-rickshaw users and 7.44 percent tonga users travel by these modes to go for shopping and other recreational activities.

6.5 Transport Facilities in Aurangabad

The three major modes of public passenger transport for intra-city travel in Aurangabad are the city buses, autorickshaws and the horse-driven tongas. No data is available regarding the personal modes of travel in the city.

6.5.1 Growth in the number of public passenger transport modes

Table 6-16 presents the data on the growth of tongas, auto-rickshaws and city buses in the city of Aurangabad and the availability of these vehicles per 1000 persons.

There were about 84 tongas, 470 auto-rickshaws and 45 city buses operating in Aurangabad in 1978. The number of vehicles available per 1000 persons in 1977 was about 0.19 tongas and buses each and 2.04 auto-rickshaws. The number of auto-rickshaws and buses grew by about 165 percent and 181 percent respectively, during the period of 1971-78. There were more number of autorickshaws and buses available per 1000 persons in 1977 than in 1971. The data available regarding the number of tongas operating in the city over the years is not very reliable due to discrepancies in the registration procedures.

Year	Auto-rickshaw	Tonga	Bus
1971	177	-	16
1972	215	-	20
1973	326	35	21
1974	417	77	21
1975	425	-	30
1976	445	124	35
1977	450	43	37
1978	470	84	45
Per 1000 persons			
(1971)	1.11	-	0.10
(1978)	2.04	0.19	0.19
Growth Rate (%)			
(1971-78)	165%	-	181%

Source: Sudarsanam, P., *Analysis of Transport Needs in Medium Sized Cities: Aurangabad Case Study* [60].

Table 6-16: Growth of public transport vehicles in Aurangabad, 1971-78

6.5.2 Percentage of passenger trips by different modes

Table 6-17 gives the percentage densities of all vehicles on the roads in Aurangabad.

The table shows that the density of bicycles is the highest among all other passenger transport modes; nearly 43.18 percent of all vehicles on the roads was accounted for by bicycles. Two-wheelers like motorcycles and scooters account for about 20.23 percent of all vehicles followed closely by auto-rickshaws at 17.50 percent. Buses account for only 3.78 percent of all vehicles on the road. There is an equal percentage

Type of Vehicle	Vehicle Density (%)
Bicycle	43.18
Scooter/motorcycle	20.23
Auto-rickshaw	17.50
Car	7.42
Bus	3.78
Bullock-cart	3.65
Trucks	2.53
Tonga	1.38
Tractor-trailer	0.33

Source: Sudarsanam, P., *Analysis of Transport Needs in Medium Sized Cities: Aurangabad Case Study* [60].

Table 6-17: Vehicle density on the roads in Aurangabad, 1977-78

of bullock-carts (3.65%) also. Personal two-wheelers account for over 60 percent of all vehicles in Aurangabad city.

6.5.3 Socio-economic characteristics of passengers by different modes

For year 1977-78, Table 6-18 gives the modal preference for all work trips by income level, and Table 6-19 gives the distribution of personal vehicle ownership by income level. Households with income less than Rs.400 per month have been referred to as low income, between Rs.401-1000 as middle income, and over Rs.1000 per month as high income households.

Nearly 57.7 percent of low income families do not own a vehicle, and 35.5 percent own a bicycle. Proportionately, only 20.4 percent use their bicycles to go to work and nearly 53.6 percent walk to their work places. Most of the remaining 16.9 percent use the city bus for travel to work.

Mode	Monthly Income		
	<Rs.400	Rs.401-1000	>Rs.1000
Walk	53.6	22.0	15.0
Bicycle	20.4	24.7	15.0
Scooter/Mc	1.7	21.7	39.3
Auto-rickshaw	1.2	2.2	1.0
Car	0.4	1.0	9.3
Company Vehicle	0.8	2.7	3.4
Bus	16.9	24.3	13.6

Source: *Report on Objective Assessment of the Role of Intermediate Transport in Cities of various Sizes*, School of Planning and Architecture, New Delhi [57].

Table 6-18: Percentage modal split for work-trips by income level in Aurangabad, 1977-78

Among the middle income households surveyed, nearly 50.9 percent owned a bicycle but only 24.7 percent used them to go to work. 22.6 percent in this income group did not own any vehicle, and 22 percent of them walked to work. Nearly 23.8 percent of these households owned scooters/motorcycles, and 21.7 percent of them used it to travel to work places. Almost 24.3 percent of the middle income people used the city bus for work trips. In the middle income households, the percentage of work trips are almost equally divided among the four major means of transport in the city, ie. walking, bicycles, scooters/motorcycles and city buses.

Type of Vehicle	Vehicle Ownership (%)		
	<Rs.400	Rs.401-1000	>Rs.1000
Bicycle	35.5	50.9	36.9
Scooter/Mc	5.4	23.8	41.3
Car	1.4	2.7	8.7
No Vehicle	57.7	22.6	13.1

Source: *Report on Objective Assessment of the Role of Intermediate Transport in Cities of various Sizes*, School of Planning and Architecture, New Delhi [57].

Table 6-19: Distribution of personal vehicle ownership by income level in Aurangabad, 1977-78

Among the higher income work travelers, scooters and motorcycles are most popular means of travel (39.3 percent). Although the bicycle ownership level is quite high at 36.9 percent, only 15 percent use them for work trips. Here it might be reasonable to say that although no specific data is available, bicycles are probably used extensively by students in the middle and high income households to travel to schools and colleges. About 15 percent of high income people also walk to their place of work and only 13.6 percent use the city bus. Only 8.7 percent of the households in this income category own a car and slightly higher percentage (9.3%) use this mode to travel to work. (Some people may be getting a ride on the cars or there may be discrepancy in survey data.)

6.6 Transport Facilities in Faridabad Complex

The primary movement in the Faridabad/Ballabhgarh complex is along the east-west axis on the national highway (see Figure 5-6). The complex does not have any intra-city public transport system. The inter-city services are provided by the Delhi Transport Corporation and the Haryana State Roadways along the national Highway with stops at more than one kilometer apart. These inter-city services primarily cater to the transport demand between Delhi and the Faridabad/Ballabhgarh Complex. The local transport demand is almost exclusively met by cycle-rickshaws. To a limited extent, tempos provide a parallel inter-city transport services, and cater primarily to the needs of the travelers to and from the nearby villages.

6.6.1 Growth in the number of cycle-rickshaws

Cycle-rickshaws are the only public transport vehicle available on hire in the Faridabad/Ballabhgarh Complex. Table 6-20 shows the growth in the number of cycle-rickshaws from 1973 to 1978 and the availability of these vehicles per 1000 persons. There were about 15.6 cycle-rickshaws per 1000 persons in the Faridabad/Ballabhgarh Complex in 1977. The number of cycle-rickshaws grew by about 186 percent during the period 1973-78.

6.6.2 Socio-economic characteristics of cycle-rickshaw users

Among the users of cycle-rickshaw, nearly 53 percent belong to the middle income group, 25 percent to the low income group and 22 percent to the higher income group as shown in Table 6-21. The average monthly income of the users of cycle-rickshaw was about Rs. 730 per month in 1977, which is the highest among all other cities in India. This, of course, is due to the fact that cycle-rickshaws are the only public mode of transport available within the complex.

Year	Number of Cycle-rickshaws
1973	1326
1974	1922
1975	2527
1976	3194
1977	3276
1978	3790
Growth Rate (%) (1973-78)	186%
Per 1000 persons (1977)	15.6

Source: *Report on Objective Assessment of the Role of Intermediate Transport in Cities of various Sizes*, School of Planning and Architecture, New Delhi [57].

Table 6-20: Growth in the number of cycle-rickshaws in Faridabad, 1973-78

Users	Monthly Income		
	<Rs.500	Rs.500-1000	>Rs.1000
Cycle-rickshaw	25%	53%	22%

Source: Maunder, D. A. C. *et. al.*, *Characteristics of Public Transport Demand in Indian Cities* [28].

Table 6-21: Distribution of users of cycle-rickshaw by monthly income in Faridabad, 1977

Table 6-22 shows that a very large percentage (75%) of the cycle-rickshaw users do not own any personal vehicle. Only 12 percent own a bicycle, 10 percent own motorcycles or scooters and 3 percent own private cars.

Type of Vehicle	Vehicle Ownership (%)
Bicycle	12%
Motor-cycle/scooter	10%
Car	3%
No Vehicle	75%

Source: *Report on Objective Assessment of the Role of Intermediate Transport in Cities of Different Sizes*, School of Planning and Architecture, New Delhi [57].

Table 6-22: Distribution of personal vehicle ownership for the users of cycle-rickshaw in Faridabad, 1977

6.6.3 Purpose of journey by cycle-rickshaw

A break up of purpose of journey by rickshaws is given in Table 6-23.

According to Table 6-23, nearly 29 percent of cycle-rickshaw trips are health related, ie. for visits to the doctor, clinics etc. (This figure seems to be unreasonably high, and it is suspected that the data may be faulty.) Although 26.84 percent use it for business purpose, only 14.97 percent use it to go to work. A fairly large number, about 16.38 percent, use this mode to reach the nearest bus stops or the railway station for a change of mode. In that capacity, cycle-rickshaws provide a feeder service to the faster modes of the transport system.

Purpose of Journey	Percentage
Work	14.97
Business	26.84
Education	0.28
Shopping	3.11
Recreation	9.32
Health and others	29.10
Change of Mode	16.38

Source: *Report on Objective Assessment of the Role of Intermediate Transport in Cities of Different Sizes*, School of Planning and Architecture, New Delhi [57].

Table 6-23: Purpose of journey among cycle-rickshaw users in Faridabad, 1977

Chapter Seven

Issues in Passenger Transport Planning in India

In India, passenger transport system consists of variety of modes, some traditional and some modern, each of which provides different kind of service in response to local transportation needs. In the preceding chapters we have looked at the level of provision of urban transport services in six cities of different sizes in India. We have also looked at their physical and economic growth characteristics to understand the nature of transport demand and pattern of trip making in these cities. It is observed that the level of passenger transport services varies quite significantly form city to city. In this chapter, we attempt to explain some of the reasons for the observed differences and similarities in the transport network of these cities, and identify some key priorities for transport planning in the future.

1. All six cities, both large and small, have a very large number of pedestrians and bicyclists. There could be several reasons for the popularity of these two modes. May be a large number of trips are still short, indicating the compact physical structure of cities. Bicycles are the least expensive form of personal vehicular transport, and are extensively used for commutation to work involving medium and long distance travel. Additionally, central core areas of the city may be best suited for these two modes due to narrow, congested road network. Inspite of the importance of these two modes in the city's transport network, no passenger surveys consider them worthy of attention; possibly, data collection for these two modes is extremely difficult because of the nature of these modes. We have not found evidence of any specific plans or policies either, that would provide better facilities and improve safety for

pedestrians and bicyclists. Footpaths and bikeways are sadly lacking in most areas of the cities studied. The urgent need for these facilities is understood and accepted, but the focus of transport planning seems to be on motorized modes. The issue is priority and urgency accorded to facilities for pedestrians and cyclists.

2. In all cities studied, the component of IPT modes in the total urban transport system is quite significant. And in addition to providing much needed services, IPT modes serve another important function by providing employment to low-income population with low levels of skills. The IPT sector also provides many more jobs in associated areas of IPT operations like construction, repairs and maintenance of vehicles. Although no specific data is available on the employment potential of the IPT sector, a rough estimate suggests that the rickshaw pulling industry supports about 175,000 people in Calcutta. Nearly 292,000 residents of Delhi (5.8 percent of the total population), 90,000 in Meerut (18 percent) and 38,000 in Faridabad (19 percent) owe their livelihood to the IPT sector. Inspite of the importance of this sector, IPT modes, especially the slow-moving ones, are not looked upon favorably by the planning authorities. Any hints of concession or formalization of the IPT sector is considered to be very volatile politically. Politicians, looking for votes, have always provided protection to this sector verbally, but the concerns of the IPT sector are generally not addressed by planners. The attitude of planners towards slow-moving IPT modes seems to be governed by the premise that it employs low, outmoded technology, which will have to be replaced by modern technology vehicles in the near future. And if these modes have to be replaced, why formalize them, because it will only create political problems when the time comes to abolish them. This gap

between promised protection but no follow up has left this sector in a limbo.

Two issues emerge from this discussion. First, what degree of significance should be accorded to the employment potential of the IPT sector in the city's economic structure. Second, should all IPT modes be promoted, or some discarded in favor of others; for example, in the state of Maharashtra cycle-rickshaws have been banned in favor of auto-rickshaws. Obviously, the decision was taken entirely independent of city size, and was based on the premise that since autorickshaws use higher level of technology, they can provide a higher level of service in terms of speed, distance covered, safety and comfort to passengers and operators. Slow moving cycle-rickshaws are considered a traffic hazard. But it is interesting to note here that no action was taken regarding the operations of tongas, which are equally slow-moving, and represent ancient technology.

3. Both Pune and Kanpur are old cities, well connected by long distance railway lines and national highways. Both have over a million population, and have relatively well developed economic base. Yet the level of provision of intra-city transport services cannot be more different. Pune has a fairly good standard bus service, and a large number of auto-rickshaws. On the other hand, cycle-rickshaws are the only intra-city public transport vehicles operating in Kanpur in addition to tempos for long distance suburban travel. The differences between these two cities is truly baffling. It seems that urban transport is not accorded as high level of priority in Kanpur as in Pune. Probably, the continuing expansion of the industrial sector in Pune has made the planners in that city more

sensitive to the travel needs of its residents. Further, the government of the city would have more financial resources available to meet the growing demands of the urban transport sector because of the rapidly growing economic base. In comparison, Kanpur has a fairly large industrial base too, but it has a preponderance of traditional industries like textiles and leather. These industries were established in the early parts of this century, and are located in the central parts of the congested old city. The industrial growth seems to have become stagnant in Kanpur, with very few new industries locating there in recent past. The commuting pattern has not changed to any large extent. Probably, distances are still short, commutable on foot or bicycle. The city limits have expanded, but it is primarily the new residential colonies which are located in the outer, less congested areas of the city. As the center of all economic, commercial and industrial activities is still the core of the city, commuting seems to follow the traditional pattern of outer rings to the central core areas. On the other hand, in Pune, industry has developed on the outer fringe of the city, thereby having a reverse commuting pattern as compared to Kanpur. The issue is whether there is a link between the level of transport services and the economic prosperity of cities. Also, the physical structure of a city changes with industrialization, thereby effecting the travel needs of the population.

4. The government, both nationally and locally, seems to be committed to its role of being the primary provider of all passenger transport services. This orientation to transport planning follows from the socialist pattern of economic growth adopted by the planners in the country soon after independence. It was felt that this pattern of centralized economic planning would provide for the most equitable distribution of scarce

resources. The premise is that only the public sector can look after the interests of the large masses of poor and low-income residents of the city. The government is extremely suspicious of the private sector and its profit motivation. The government probably feels that inspite of controls and regulations, it will not be able to monitor private sector enterprises very effectively. In the transport sector also, we find that all standard bus services are totally controlled by the public sector companies. (See Appendix A for details on the regulatory framework for the operation of public transport modes in India.) But they are unable to meet the demands of the market for variety of reasons. The government seems to be wary of letting the private sector become the primary provider of urban transport services. Is there a mid-way path between total monopoly of either public or private sector?

Chapter Eight

Recommendations

In this thesis, we have looked at the level of provision of different types of public and private transport services in six cities of different sizes in India. In general, the level of public transport service declines with city size, however, there are some exceptions. Kanpur, the eighth largest city in India, is almost entirely dependent on cycle-rickshaws as far as public transport is concerned. In comparison, Aurangabad (population 0.23 million in 1977), a medium size city, has a balanced mix of different public transport modes. By and large, the study suggests that most Indian cities, large and medium size, will continue to have a mix of conventional standard bus and intermediate public transport (IPT) services. The importance of IPT services over the standard bus services, or vice-versa, will depend to large extent on the physical expansion of cities and population growth. Longer work journeys will call for lower cost of travel per kilometer and higher speed of travel. As cities experience economic growth with greater industrialization, the need to move larger volume of people over longer distances will also increase. This will call for faster transport services with larger capacities. In large metropolitan cities, standard bus services along with suburban railways are the two most important modes for long distance intra-city travel. The underground railways is also an efficient mode for moving large volumes of people at very fast speeds over long distances. But due to very high construction costs, most cities in developing countries consider it to be very expensive. In India, underground railways is under construction in Calcutta only, and experiences there have discouraged planning for underground railways in other large cities.

Based on data, discussions, and observations presented in the preceding chapters, we can make some recommendations for the improvement and planning of public transport services in large and medium size cities in India.

Walking and bicycling are the two most important modes of transportation in cities of all sizes in India. Therefore, facilities for these two modes should be accorded the highest priority. Footpaths, pedestrian crossings, and bicycle pathways, along with proper traffic education for pedestrians and bicyclists are urgently required. However, just the provision of these facilities is not enough. Steps have to be taken to make sure that they are kept free from misuses, for example, by hawkers.

IPT modes provide an important service to both the rich and the poor inspite of higher cost of per unit service. The rich may use IPT services more often than the poor, but the latter need and use these services in emergencies. Generally, in large cities which have a well established standard bus service or suburban railway service, IPT modes are used for social, recreational and medical related journeys. They are also used for change of mode, i.e., for travel to and from the bus or railway station, often with luggage. In smaller cities, IPT modes may be the only modes of public transport. In that case, IPT modes are used for all kinds of journeys, including work and business trips. Of course, walk and bicycle trips are predominant in small cities because of shorter distances. Education related trips, especially for small children, are quite significant for IPT modes in both large and small cities. In view of the important service rendered by the IPT modes, it is only proper to recognize their contribution to the entire public transport system. IPT modes should be fully integrated into the urban transport system, and should be accorded proper role and importance in the overall transport plans for the city. This will involve progressive regulations for the operations, licensing, fare policy and loan provisions for IPT modes. IPT modes provide large employment opportunities to the poor, but the new entrants into this trade are usually illiterate and inexperienced. IPT operators should be provided with proper training regarding traffic rules and regulations. All rules and regulations should be strictly enforced to enhance road safety and smooth flow of traffic. Parking is also an important issue, both with respect to IPT operations and

private vehicles. IPT vehicles that provide taxi-like service have to wait on road-sides for passengers. Proper waiting stands should be constructed for IPT modes. And IPT modes that provide bus-like services should be made to adhere to bus-stop or IPT-stop regulations.

Standard bus services are almost entirely provided by the government in both small and large cities. They are generally overcrowded, and the level of service is far from desirable. Furthermore, most government owned urban bus services have large deficits. The perception of the general public is that they are inefficient. This may be true to some extent, but artificially low fares on standard bus services makes it extremely difficult to meet the operating expenses. Also, since the bus companies are public sector undertakings, they have to provide minimum level of employee wages and other benefits. Proponents of private sector services often argue that private sector bus operators run in profit as compared to public sector operations, although both of them charge similar fares. But we have to consider the lower overheads for private operators. The employee pay and benefits are generally much lower than public sector bus employees; the hours of duty are more strenuous and longer for private sector employees. Sometimes the bus driver may also double as a mechanic for minor repairs. Moreover, private sector bus drivers and conductors earn a commission based on number of passengers carried and number of runs made. So on one hand we have greater efficiency among private sector operators at the cost of lower wages and strenuous work hours, and on the other hand, higher over heads and relatively less efficient public sector bus operations at the benefit of better emoluments and working conditions for the employees. Public sector bus companies have to depend on large subsidies form the government for their daily operations, and more importantly, for the maintenance and expansion of services and equipment. Because of paucity of funds at both municipal and state level, urban bus services in most cities are extremely inadequate. Bus fleet is old and poorly maintained leading

to greater breakdowns on the roads. In Indian cities, by and large, private operators are not allowed to operate standard bus services with the result that private capital is not utilized to augment the much needed services. It is suggested that private operators be allowed to participate in the provision of standard bus services in both large and small cities. Additionally, smaller buses (like mini-buses) should be used in small cities or on less voluminous routes to assess the need and demand for such services. It is felt that to some extent, potential travelers should get used to a type of service before it is introduced with full force. This is especially true in small cities which do not have an established clientele for a particular type of service; the administrative and managerial capabilities also do not exist to operate and sustain such a service.

We need to explore the market for specialized bus services at premium price, offering premium service, in large cities. This will enable the operators to charge fares equivalent to the true cost of service from the people who can afford to pay for higher level of service. It is also possible to cross subsidize ordinary bus services with specialized services. Even the public sector bus companies can operate these dual levels of service provided proper check is maintained that one is not provided at the cost of other.

Appendix A

Regulatory Framework for the Operation of Public Transport Modes

Urban transport modes in India can be broadly categorized into mechanized and non-mechanized vehicles. Standard buses, minibuses, tempos, taxis, motorcycle-rickshaws and auto-rickshaws are the mechanized modes of public transport. The non-mechanized modes consist of hand pulled-rickshaws, cycle-rickshaws and tongas. Generally, the State Government is responsible for regulating the operation of all mechanized modes, although the Central Government does have the power to legislate in the interests of uniformity and better coordination among different modes. The regulation for motorized modes is by and large common throughout the country. The regulation for the operation of non-mechanized modes falls under the jurisdiction of local and municipal bodies.

The Motor Vehicles Act (MVA), which was first enacted in 1939, is the most important piece of legislation governing the operation of standard buses, minibuses, and contract carriages in India. Minibus operators have to obtain a *permit* in advance. The *permit* has to specify the route of operation with approved stops for boarding and alighting of passengers along the route and the time-period for the operation of service. The *contract carriages* are chartered bus services (standard or mini- buses may be used) used for collective transportation of a group of people having a common destination. Chartered services are used extensively by large industrial units to transport workers and staff. More recently, they are becoming very popular in cities like Delhi, Calcutta, Bombay and Hyderabad, for transporting office workers from residential areas on the outskirts of the city to the central business district. Contract carriages may be operated by (a) private companies or organizations, (b)

private operators entering into contract with organizations or group of people, or (c) public sector transport undertakings assigning a part of their fleet to chartered services.

The standard bus services in urban areas in India are mostly provided by the public sector. The Indian Parliament enacted the Road Transport Corporation Act in 1950, which enabled the State Governments to set up the public sector transport organizations. These organizations, known as the State Transport Undertakings (STUs), primarily cater to the inter-city transport needs in the state. However, some STUs do operate the urban bus services, e.g. Hyderabad, Kanpur, Lucknow. In 1956, the Motor Vehicles Act was amended to give preference to STU over private bus operators, whenever necessary. The STU of a state could propose schemes for public transport in any region of the state previously serviced by private operators. Such schemes are generally approved by the government and regional transport authorities.

The Regional Transport Offices (RTOs) are assisted and advised by the State Transport Departments regarding the performance of their various duties. The duties of RTOs consist of the registration of motor vehicles, issuing of driver licenses, issuing of periodic fitness certificate to public transport vehicles and investigation of motor vehicle accidents jointly with the police officials. The RTOs are also responsible for the collection of motor vehicles tax (also known as road tax) and license fees, along with the enforcement of operating conditions outlined in various permits and licenses.

In addition to the regional and state transport authorities, some states have constituted the State Transport Appellate Tribunals (STATs) to consider appeals against the decisions taken by the various transport authorities. The STATs are presided over by senior judges, whose decisions can be appealed in the High Court or the Supreme Court.

There are three additional pieces of legislation which are complementary to the Motor Vehicles Act. These legislations are: (a) Motor Vehicles Rules, (b) Motor Transport Workers Act, and (c) Motor Vehicles Taxation Act.

In order to accommodate regional diversities, the State Governments are empowered to make rules in accordance with the general guidelines outlined in the Motor Vehicles Act of India. **The Motor Vehicles Rules** of each state lays down the detailed procedures for the implementation of Motor Vehicles Act. For example, the fitness certificate is generally issued for two years in the case of new vehicles, thereafter annual inspection is required for the next three years, followed by half-yearly inspections.

The Motor Transport Workers Act was enacted in 1956. This legislation regulates the welfare and working conditions of the motor transport workers. For example, the Act limits the normal working hours to eight hours a day, lays down the norms for rest periods, split duty, spread over limits, overtime payments, etc. Employers are required to provide restrooms for the staff, subsidized food in the canteens, supply of uniforms and shoes etc. However, this Act is applicable only to those transport establishments that employ more than five workers, consisting of drivers, conductors, ticket inspectors, etc. But, mechanics and other maintenance staff are covered separately under the Factory Act.

Motor Vehicles Tax is an important source of revenue for the States. The motor vehicles taxes are levied, regulated and collected by the State Governments under the provisions made by the **Motor Vehicles Taxation Act** (MVT Act). Any motorized vehicle is required to pay the motor vehicle tax (also known as token tax or road tax) and license fee for the permit that authorizes its operator to provide public transport services. The motor vehicle tax and the license fee for different kinds of permits are a fixed amount payable annually. In addition, passenger transport vehicles, specifically

the stage carriage buses and the minibuses, are required to pay passenger tax either as a percentage of fare revenue, or on the basis of seating capacity of the vehicle. A flat rate is charged as passenger tax for contract carriages.

Apart from the taxes collected by the state under the provisions of the MVT Act, the Central Government also collects some non-specific or variable taxes which vary with the operations of individual vehicles. These taxes are levied in the form of excise duty, sales tax, and customs duty on fuel, lubricants, tires and spare parts for the motor vehicles. These taxes are quite substantial and contribute towards the public expenditure budget for the development and maintenance of roads.

At the local level, some municipal governments have imposed *octroi tax* on the entry of goods into a local area for personal consumption or sale.

A.1 Need for Reform

The Motor Vehicles Act lends itself primarily to the management and control of stage-carriage buses, minibuses and contract carriages. But most Indian cities are experiencing a surge in the growth of intermediate transport vehicles (IPT) like cycle-rickshaws, auto-rickshaws, tempos. The RTOs are responsible for issuing permits for the operation of all fast moving IPT vehicles after evaluating the demand for their services. But most often no systematic study is conducted to evaluate the role of each mode and their respective demands. The transport officials are highly vulnerable to corrupt practices due to low wages, fewer promotional avenues for the staff of the RTOs, and difficulties in the enforcement of permit rules. Consequently, the entire process of awarding of permits and route designations are open to bribery and malpractices. Also, due to lack of motivation and knowledge, the RTO officials limit their activities to the interpretation of rules in the restrictive sense, rather than to facilitate better transportation practices.

The fares for taxis, auto-rickshaws and tempos are regulated, and meters are periodically inspected to ensure their performance. However, due to ineffective enforcement procedures, operators of these vehicles often demand exorbitant fares or refuse service at will. Frequent increases in petroleum prices necessitates constant revision of fares, which results in passenger confusion about current rates. Ride-sharing is not permitted in taxi services, yet it is becoming increasingly common in most cities, especially during peak periods. Taxis operate bus-like services between fixed origin and destination, and charge fixed fare on per passenger basis. Of course, meters are never operated on such services.

Tempos generally operate bus-like services; yet they have been issued taxi-permits in Kanpur and contract carriage bus permits in Jaipur. Minibuses in Jaipur operate under a license meant for standard buses, but do not pay any passenger tax.

Operation policies regarding cycle-rickshaws and auto-rickshaws vary between different states as well as within states. Cycle-rickshaws are not permitted in the state of Maharashtra. Thus, Pune and Aurangabad have a very high number of auto-rickshaws. Bombay does not permit even the operation of auto-rickshaws, except in the far out suburban areas. In contrast, Hyderabad in Andhra Pradesh State has almost an equal number of cycle- and auto-rickshaws, both modes often compete with each other. Whereas in Kanpur, as in most other cities in Uttar Pradesh, cycle-rickshaws are the only available mode of public transport in the city.

Both tongas and cycle-rickshaws are generally issued licenses by the local municipal bodies. These vehicles do not pay any taxes. Tongas are gradually being replaced by auto- or cycle-rickshaws due to increasing cost of operation.

Generally, the permit issuing process in the Motor Vehicles Act begins with an application from an intending operator. The RTOs never undertake an independent

study to evaluate the transport needs of a region, and hence are in no position to evolve viable route structures. In fact, not long ago, there was a dispute whether a transport authority could at all propose and advertise for operation of a route. The court did rule in favor of the implied power of the transport authorities to propose a route.

The National Transport Policy Committee (NTPC) submitted a report to the Government of India in 1980 in which it has recommended a drastic revision of the regulatory framework concerning public transport. It has suggested that a National Transport Commission be established for advising the State Governments on transport policies and coordination, and for undertaking independent studies on various aspects of transport economics and management.

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